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Safety

**USAF SAFETY DEPLOYMENT AND
CONTINGENCY PAMPHLET**

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This directive implements Air Force Policy Directive (AFPD) 91-2, Safety Program. This pamphlet is an aggregate of many documents, deployment guides, technical orders (TO), Air Force Instructions (AFI), Air Force Occupational Safety and Health (AFOSH) standards and others. This pamphlet is not intended to replace any existing document or the mandatory compliance with any document. Compliance with this pamphlet is not mandatory. It is intended to assist commanders, commander's representatives, planners, supervisors, and all personnel concerned with the safety and health of Air Force resources. Safety and health professionals involved with preventing mishaps and evaluating and mitigating risks associated with all phases of deployments and contingencies are certainly encouraged to use this guidance. Information included in this pamphlet is also intended to provide some insight to deployed operations and conditions. Losses on any future contingency are preventable through the application of sound Operational Risk Management (ORM) principles when making informed decisions; establishing and enforcing high standards of performance; creating a conscientious command climate, and recognizing the effects of stress and fatigue on human performance. Mishap prevention is an important weapon in our arsenal and this pamphlet is a quick reference guide intended to help prevent mishaps during contingency operations and to multiply combat resources through asset preservation. Much of the information presented, is also intended to prepare for deployment, those individuals tasked with mishap prevention and occupational safety and health program responsibilities associated with deployment and contingency operations.

Major commands (MAJCOM), direct reporting units (DRU), and field operating agencies (FOA) may supplement this pamphlet as needed. Send comments and suggested improvements to Headquarters Air Force Safety Center, Ground Safety Division, Safety Engineering and Standards Branch (HQ AFSC/SEGS), 9700 G Avenue, SE, Suite 222, Kirtland AFB NM 87117-5670, on Air Force (AF) Form 847, **Recommendation for Change of Publication**.

The ability of a unit to conduct a successful safe operation through all phases of preparation, deployment, employment, and redeployment depends on the adequacy of individual staff planning and training efforts. Operation Plans (OPLAN) should be studied to determine deployment configurations and mission support requirements. Each annex to the Installation Deployment Plan (IDP) should be tailored to support specific requirements or concept of operation needs. Thorough and complete deployment planning is essential and can be realized through quality review, base exercises, and commanders and staff agencies

evaluations. Process ownership belongs to the host unit and (or) deployment commander and they should ensure local deployment guidance defines the process and procedures necessary to deploy forces.

No TO, AFI, AFOSH standard, operating instruction, or pamphlet can possibly address every hazard or potential hazard that may arise from a specific task or combination of tasks. Where situations exist that do not appear to be adequately covered by existing directives, use an ORM process to assess risk associated with those situations and determine adequate safeguards or procedures to manage the risk. **NOTE:** The ORM process may not be used to violate directives or other regulatory guidance. Normal waiver or variance procedures must be followed in all cases.

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

This revision includes a significant amount of information not included in AFPAM 91-216, 1 Dec 98. Chapters have been rearranged and renumbered and new attachments have been added.

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Chapter 1

INTRODUCTION

1.1. Safety Planning in Contingency Operations. Safety planning and Operational Risk Management (ORM) can prevent the accidental destruction or loss of aerospace forces used to carry out an assigned mission. The planner must recognize necessary planning variations in wartime, be fully aware of the commander's analysis of the mission, and make plans that promote mission objectives safely.

1.1.1. Time, location, facilities, environmental conditions, equipment, and mission urgency can make it necessary to accept certain hazards and risks to achieve the necessary objectives.

1.1.2. Safety standards and programs must be considered during mission planning. Certain missions may, however, require acceptance of unavoidable risks to reach primary mission objectives. However, ORM may not be used to violate or circumvent standards or requirements. As part of ORM, prior to acceptance of any risk, ensure risk decisions are made at the appropriate level.

1.1.3. The acceptance of hazards or risks under certain conditions does not mean they should be allowed to become operational norms. When full safety compliance cannot be maintained, every available and practical measure must be applied to reduce or control the risk.

1.1.4. When the need for noncompliance no longer exists, standard safety procedures must be reestablished. When risks or hazards are accepted, all personnel involved in the operation should be completely informed of what these conditions are, why they exist, what adverse effects they may create, and controls implemented to minimize as much risk as possible.

1.2. Mission Analysis. It is important to review as many aspects of the deployment or contingency as possible. A thorough analysis prior to departure may facilitate correction of many issues before they become problems. Failure to advise commanders and mission planners of potential problems could result in an unnecessary mishap. To prevent individuals from abandoning safety in an effort to accomplish the mission:

1.2.1. Ensure all personnel know, use, and apply the six-step Operational Risk-Management process to all operations.

1.2.2. Establish a command climate from the outset that promotes safety. Begin by establishing a safety network, designating safety personnel.

1.2.3. Establish and enforce standards; require all personnel to perform to standard in all operations.

1.2.4. Areas that impact the conduct of safe operations can be examined before deployment. These may include:

1.2.4.1. **Billeting.** Finalize arrangements before departure and ensure they provide for adequate crew rest.

1.2.4.2. **Medical.** Identify all medical facilities and personnel. Medical personnel should identify potable water sources, approved food sources, and precautions to protect personnel against local health threats. Ensure plans are made to provide personnel with required immunizations prior to mobility processing. Identify deploying medical personnel and ensure they can be quickly located. A pre-deployment medical force protection briefing should be accomplished prior to departure.

1.2.4.3. Transportation. Ensure controls for flight line access and control of vehicles, rental cars, etc., are arranged before departure. Evaluate local driving rules, regulations, and road conditions to identify significant factors that may impact personnel or vehicles. **NOTE:** A HQ AFSC/SEG website is located at

http://safety.kirtland.af.mil/AFSC/RDBMS/Ground/new_page_1.htm#local that lists several overseas locations local driving conditions and traffic safety briefs.

1.2.4.4. Off-Duty Hazards. Research and identify local conditions, laws, hazards, driving conditions, etc., and make arrangements to brief deploying personnel prior to departure or immediately upon their arrival at the deployed location. (See **Attachment 2.**)

1.2.4.5. Fire Protection. Maintenance personnel should be prepared to bring fire extinguishers for flight line use. Ensure "Tent City" fire extinguishers and smoke detectors (one each for each tent) are not overlooked and that they work prior to home station departure. If detectors are battery operated include appropriate sized batteries. Ensure fire fighting and rescue capabilities meet established criteria outlined in the War and Mobilization Plan, Volume 1, Annex S, Appendix 5.

1.2.4.6. Climate and Weather. Ensure expected weather conditions are briefed to deploying personnel so that they can plan accordingly. Issue of appropriate uniform clothing for the deployed climate and current weather conditions should be accomplished or arranged. Issue of appropriate supplies, such as sunscreen or insect repellent should also be considered and arranged. (See **Chapter 12**)

1.2.4.7. Explosives Safety. Provide written procedures for all phases of munitions operations at deployed locations. Ensure explosive site plans are available. (See **Chapter 9.**)

1.2.4.8. Flammables and Combustibles:

1.2.4.8.1. Emphasize the need for spill control. Remind personnel to remove contaminated soil from operational areas at once because there may be extreme fire and vapor hazards in hot, dry conditions. Personnel involved in any type of spill clean-up or disposition of contaminated materials will be provided with necessary PPE.

1.2.4.8.2. Protect flammables (flashpoint less than 100 degrees Fahrenheit [F]) and combustibles (flashpoint 100 degrees F or greater) from extreme heat exposure.

1.2.4.9. Environmental Considerations. Hazardous waste areas and hazardous materials operations can threaten the environment and personnel. Plans developed should include procedures for handling the accumulation, storage, and disposal of hazardous waste. This may also require additional materials at deployed locations. Spill kits, approved transportable containers for waste materials and plans to execute cleanup projects must be considered. Hazardous material spills must be cleaned up to the point that contamination poses no imminent and substantial danger to human health or safety. Environmental safeguards must also be accounted for while considering operational needs.

Chapter 2

OPERATIONAL RISK MANAGEMENT (ORM)

2.1. Introduction to Operational Risk Management:

2.1.1. The ultimate objective for any Air Force organization is maximizing combat capability. Important elements of this objective include protecting our personnel and conserving combat weapon systems and their support equipment. Preventing mishaps and reducing losses is an important aspect of conserving these resources. ORM contributes to mishap prevention, and therefore to combat capability, by minimizing risks due to hazards consistent with other cost, schedule, and mission requirements. The fundamental goal of ORM is to enhance mission effectiveness at all levels while preserving assets and safeguarding the health and welfare of personnel. Beyond reducing losses, ORM also provides a logical process to identify and exploit opportunities that provide the greatest return on our investment of time, dollars, and personnel.

2.1.2. Accomplishing the mission includes managing risk affecting people and resources. Attempt to analyze and anticipate as many hazards as possible before deployment. This pamphlet by itself is not a complete ORM program. It will highlight the most hazardous functional areas and give insight to hazards previously experienced during other contingency operations.

2.1.3. Risk is the potential for mission degradation or failure, injury, damage, or loss, and is present in everything we do. It is measured by several factors including the potential severity and the probability of occurrence. Hazards are conditions that have the potential to negatively impact the mission and (or) cause injury, damage, or loss. To manage risk, identify potential hazards, then, take the steps necessary to prioritize the potential hazards using a Risk Assessment Code (RAC) priority system. Time may not allow elimination of all hazards, thus, the importance of priorities. An active risk assessment culture will help the deploying force alter mishap possibilities. Situational awareness needs to be based on an accurate perception and include all probable options. A risk decision should reflect controls guaranteeing the minimum risk necessary for mission accomplishment.

2.1.4. All United States (US) Air Force missions and daily routines involve risk. All operations require decisions that include risk assessment as well as ORM. Each commander and supervisor, along with every individual, is responsible for identifying potential risks and adjusting or compensating appropriately. Risk decisions must be made at a level of responsibility that corresponds to the degree of risk, taking into consideration the significance of the mission and the timeliness of the required decision. Risk should be identified using the same disciplined, organized, and logical thought-processes that govern all other aspects of military endeavors. The US Air Force aim is to increase mission success while reducing the risk to personnel and resources to the lowest practical level.

2.1.5. ORM is the process used by decision-makers to reduce or offset risk. The ORM process provides leaders and individuals a systematic mechanism to identify and choose the optimum course of action for any given situation. ORM must become a fully integrated element of planning and executing an operation. The ORM process is applicable to all levels of military operations from strategic to tactical. Commanders are responsible for the routine application of ORM in the planning and execution phases of all missions, whether they are combat or support operations.

2.1.5.1. ORM is a logic-based, common sense approach to making calculated decisions on human, material, and environmental factors before, during, and after Air Force mission activities and operations. It enables commanders, functional managers, supervisors, and individuals to maximize operational capabilities while minimizing risks by applying a simple, systematic process appropriate for all personnel and Air Force functions. Refer to AFPAM 90-902, *Operational Risk Management Guidelines and Tools*, for additional information.

2.1.5.2. The use of ORM as part of the planning and execution phases of deployment can mean the difference in successful mission completion, or not. Using the ORM process for identifying and controlling hazards will help commanders reduce their risk during planning and execution of deployed operations. Controlling hazards protects the force from unnecessary risks. Eliminating unnecessary risks opens the way for audacity in execution and preserves combat power.

2.2. Planning:

2.2.1. Good ORM is crucial to operational readiness and safe mission accomplishment. We cannot afford to lose our scarce resources to poor judgment or faulty reasoning. All available resources must be applied to mission accomplishment. ORM must be integrated into all operations to preserve resources and ensure all forces return safely home.

2.2.2. People and material are at greater risk while supporting contingencies—whether a natural disaster, base-wide exercise, or joint operations at a bare base. It is everyone's responsibility to minimize the hazards, but safety personnel should take a leading role in identifying methods, techniques, and procedures that are or could be effective in protecting personnel from controllable hazards.

2.2.3. In most contingency operations, you will have time to prepare your strategy. You should pull together a team of risk assessment specialists from the safety, fire, health services, and functional managers participating in the contingency. This team will help you understand the risks associated with deployed operations to allow you to make the safest possible decisions and achieve mission objectives.

2.2.4. Contingency and exercise manpower is often comprised of augmentees. Although they should be trained, they may lack proficiency in diverse mission scenarios.

2.3. Integrating ORM Into Contingency Operations:

2.3.1. During initial planning stages, perform a risk analysis. Contact personnel from ground, flight, and weapons safety, fire, health, environmental, and security agencies to assist with the identification of and solutions to contingency hazards. Conduct pre-deployment surveys at both home installations and contingency sites to identify and ensure abatement of potential hazards before a full-scale deployment. Site surveys may have already been performed at some deployment locations. Contact AOR MAJCOM to determine if any surveys are already available, if needed obtain copies as appropriate. In addition, inspect all facilities, flight line areas, munitions storage areas, and roadways that are going to be used. Abatement of identified hazards should begin prior to initiation of actual deployment.

2.3.2. Implement a hazard reporting and hazard abatement program during contingencies. Ensure all personnel know how to report hazards immediately to permit timely correction or mitigation.

2.3.3. Be alert that many people may want to deviate from established and proven safety practices. This is only acceptable after all risks are considered and appropriate measures are implemented to reduce the risk to an acceptable level. Responsible decision-makers must weigh the risks and take

appropriate measures to prevent unnecessary sacrifices of their people and equipment. The possibility of a language, cultural, or military service policy difference may exist due to multi-Department of Defense (DoD) components and foreign national involvement.

2.3.4. Establish positive communications within the organizational structure; include other services counterparts, and the next higher echelon—this is invaluable to good ORM. This is particularly useful during joint operations with other US services or with armed forces of other countries.

2.3.5. Personal Protective Equipment (PPE) and miscellaneous gear. Lack of available PPE is a common problem at deployed locations. Plans should include PPE not only for industrial workers, but augmentees as well. Many people will also find it difficult and cumbersome working in clothing and other gear that they may be unaccustomed to wearing. For example, goggles to protect against blowing sand or heavy cold weather footwear can make operation of equipment or vehicles difficult. Make sure personnel understand their new environment and take extra precautions when needed. Training in a non-mission environment should be conducted to ensure personnel are aware of potential hazards and work-a-rounds while wearing PPE.

2.3.6. Watch for stress. All contingency operations have proven stressful and people under stress often make mishap-causing mistakes. Family separation and unfamiliar working and living environments can increase stress. These factors are part of military life, but during contingency operations they may become insurmountable for some individuals. Symptoms of stress might include:

- 2.3.6.1. Fatigue not explained by physical activity, i.e., feelings of hopelessness or helplessness.
- 2.3.6.2. Increased alcohol consumption.
- 2.3.6.3. Health-related problems including multiple complaints of minor aches and pains and sickness.
- 2.3.6.4. Suicidal thoughts or attempts at self harm.
- 2.3.6.5. Irritability—people getting angry easily or being overly sensitive to any sort of feedback.
- 2.3.6.6. Withdrawal—people pulling inside themselves and not seeming to pay any attention to what you are saying.
- 2.3.6.7. Forgetfulness—short-term memory loss.
- 2.3.6.8. Projecting blame—when a person in essence says, “I only did it because you told me to do it, so it’s your fault.”

2.3.7. To reduce stress to an acceptable level:

- 2.3.7.1. Exercise (non-competitive).
- 2.3.7.2. Allow people time to walk away when they are upset. This may allow them to gain a better perspective upon their return.
- 2.3.7.3. Encourage early, open discussion concerning operational problems within the supervisory chain; early detection and solution precludes larger problems later.
- 2.3.7.4. Encourage discussion regarding any problems.
- 2.3.7.5. Promote moderation in all that is done.

2.3.8. Know what off-duty activities people are planning. Even on contingency operations, the majority of Air Force reportable mishaps occur off-duty. Traffic mishaps commonly claim the lives of Air Force personnel. Speed, lack of seat belt use, alcohol use, fatigue, and unfamiliar or poorly marked roads often contribute to traffic mishaps. Also, encourage leaders and supervisors to visit living quarters frequently to ensure quality of life and safety issues are addressed. People work better knowing someone is personally concerned about his or her welfare. Services personnel can often make sure sports and recreation activities are planned and equipment is available. Provide supervision for recreational and sporting activities when deemed necessary.

2.4. The ORM Process. ORM is a six-step process:

2.4.1. Step 1—Identify the Hazards. Hazard can be defined as any real or potential condition that can cause mission degradation, injury, illness, or death to personnel, or damage to or loss of equipment or property. Factors to consider when identifying hazards:

- 2.4.1.1. Time for mission preparation and execution;
- 2.4.1.2. Terrain (rough, hills, swamp, etc.);
- 2.4.1.3. Extended work hours and probability of fatigue;
- 2.4.1.4. Competition for time (training versus safety briefings);
- 2.4.1.5. Skill level of personnel;
- 2.4.1.6. Operational hazards;
- 2.4.1.7. Water hazards;
- 2.4.1.8. Road conditions (narrow, congested, curves, hills, etc.);
- 2.4.1.9. Communication requirements (between units, joint service);
- 2.4.1.10. Weather (existing and forecast);
- 2.4.1.11. Equipment condition (age, maintenance, etc.);
- 2.4.1.12. Cargo (type, quantity, security);
- 2.4.1.13. Hazardous material (fuel, munitions, etc.);
- 2.4.1.14. Enemy;
- 2.4.1.15. Critical mishap problem areas;
- 2.4.1.16. Transportation to and from the operational site;
- 2.4.1.17. Intensity of operations;
- 2.4.1.18. Potable water;
- 2.4.1.19. Adequate sanitation;
- 2.4.1.20. Off-base food and potable water supply;
- 2.4.1.21. Physical fitness of personnel;
- 2.4.1.22. Personnel attitudes (poor or bad motivation);
- 2.4.1.23. Maintenance hazards;

- 2.4.1.24. Building conditions (fire hazards, integrity of structure, etc.);
- 2.4.1.25. Convoy route (sufficient room for rest areas);
- 2.4.1.26. Logistical support;
- 2.4.1.27. Animal, insect, or plant hazards;
- 2.4.1.28. Day versus night operations;
- 2.4.1.29. Speed limits;
- 2.4.1.30. Supervision (direct or indirect);
- 2.4.1.31. Personal Protective Equipment (PPE);
- 2.4.1.32. Work and rest cycles;
- 2.4.1.33. Contracted equipment and operators.
- 2.4.1.34. Airfield hazards and departure obstacles.

- 2.4.1.34.1. Wildlife.

- 2.4.1.34.2. Terrain.

2.4.2. Step 2—Assess the Risk. Risk is the probability and severity of loss or adverse mission impact from exposure to the hazard. Assessment is the application of quantitative or qualitative measures to determine all the levels of risk associated with a specific hazard. The assessment step in the process defines the probability, severity, and exposure of a mishap that could result from the hazard.

2.4.3. Step 3—Analyze Risk Control Measures. Investigate specific strategies and controls that reduce or eliminate risk. Effective control measures reduce one of the three components (probability, severity, or exposure) of risk.

2.4.4. Step 4—Make Control Decisions. Decision makers at the appropriate level choose controls based on analysis of overall costs and benefits.

2.4.5. Step 5—Implement Risk Controls. Once control strategies have been analyzed, an implementation strategy needs to be developed and then applied by management and the work force. Implementation requires commitment of time and resources.

2.4.6. Step 6—Supervise and Review. ORM is a process that continues throughout the life cycle of the system, mission, or activity. Once controls are in place, the process must be scrutinized to determine its effectiveness.

2.5. The ORM Rules. This six-step process is governed by four rules:

2.5.1. Rule 1—Accept no Unnecessary Risk. Unnecessary risk comes without a commensurate return in terms of real benefits or available opportunities. All US Air Force missions and our daily routines involve risk. All activities require a basic understanding of hazards and risks as well as appropriate controls. The most logical choices for accomplishing a mission are those that meet all mission requirements while exposing personnel and resources to the lowest acceptable risk. ORM provides tools to determine which risk or what level of risk is unnecessary. The corollary to this axiom is “accept necessary risk” required to successfully complete the mission or task. As an example, choosing the lowest threat ingress to a target versus the most direct route avoids unnecessary risk.

2.5.2. Rule 2—Make Risk Decisions at the Appropriate Level. Making risk decisions at the appropriate level establishes clear accountability. Those accountable for the success or failure of the mission must be included in the risk decision process. Anyone can make a risk decision; however, the appropriate level for risk decisions is the one that can allocate the resources to reduce the risk or eliminate the hazard and implement controls. Commanders at all levels must ensure subordinates know how much risk they can accept and when they must elevate the decision to a higher level. Typically, the commander, leader, or individual responsible for executing the mission or task is:

2.5.2.1. Authorized to accept levels of risk typical of the planned operation (i.e., loss of mission effectiveness, normal wear and tear on material).

2.5.2.2. Required to elevate decisions to the next level in the chain of command after it is determined that controls available to him or her will not reduce residual risk to an acceptable level.

2.5.3. Rule 3—Accept Risk When Benefits Outweigh the Costs. All identified benefits should be compared to all identified costs. The process of weighing risks against opportunities and benefits helps to maximize unit capability. Even high-risk endeavors may be undertaken when there is clear knowledge that the sum of the benefits exceeds the sum of the costs. Balancing costs and benefits may be a subjective process and open to interpretation. Ultimately, the balance may have to be determined by the appropriate decision authority.

2.5.4. Rule 4—Integrate ORM into Air Force Doctrine and Planning at all Levels. To effectively apply ORM, commanders must dedicate time and resources to incorporate ORM principles into the planning processes. Risks are more easily assessed and managed in the planning stages of an operation. Integrating ORM into planning as early as possible provides the decision maker the greatest opportunity to apply ORM principles. Additionally, feedback must be provided to benefit future missions and activities.

2.6. ORM Responsibilities:

2.6.1. Commanders:

2.6.1.1. Are responsible for effective management of risk.

2.6.1.2. Select from risk reduction options provided by the staff.

2.6.1.3. Accept or reject risk based on the benefit to be derived.

2.6.1.4. Train and motivate leaders to use ORM.

2.6.1.5. If not authorized to accept high level risks, elevate to the appropriate level.

2.6.2. Staff:

2.6.2.1. Assess risks and develop risk reduction options.

2.6.2.2. Integrate risk controls into plans and orders.

2.6.2.3. Identify unnecessary risk controls.

2.6.3. Supervisors:

2.6.3.1. Apply the ORM process and direct personnel to use it both on- and off-duty.

2.6.3.2. Consistently apply effective ORM concepts and methods to operations and tasks.

2.6.3.3. Elevate risk issues beyond their control or authority to superiors for resolution.

2.6.4. Individuals:

2.6.4.1. Understand, accept, and implement ORM processes.

2.6.4.2. Maintain a constant awareness of the changing risks associated with the operation or task.

2.6.4.3. Make supervisors immediately aware of any unrealistic risk reduction measures or high-risk procedures.

2.7. Risk Assessment. Combine the severity and probability estimates to form an assessment for each risk. The Operational Risk Assessment Matrix forms the basis for judging both the acceptability of a risk and the management level at which the decision on acceptability will be made. Use [Table 2.1.](#) to combine severity and probability estimates for each hazard identified during ORM Step 1.

Table 2.1. Operational Risk Assessment Matrix.

			Probability				
			Frequent	Likely	Occasional	Seldom	Unlikely
			A	B	C	D	E
S E V E R I T Y	Catastrophic	I	Extremely High		High		Medium
	Critical	II			Medium		
	Moderate	III	High	Medium		Low	
	Negligible	IV	Medium				
			Risk Levels				

2.8. Examples Of Control Measures For Hazards Involved In Deployment Operations:

2.8.1. Hazard—Inadequate Fire Protection:

2.8.1.1. Coordinate with local fire departments for coverage.

2.8.1.2. Optimize use of available extinguishers.

2.8.1.3. Ensure firefighters are aware of the types of hazardous materials being loaded so they can be prepared with the proper extinguishing equipment and materials.

2.8.2. Hazard—Material-Handling Equipment:

2.8.2.1. Identify and use trained and certified personnel.

2.8.2.2. Train and certify additional operators for long-term operations.

2.8.3. Hazard—Lack of proper Personal Protective Equipment (PPE):

- 2.8.3.1. Ensure leather work gloves are provided during movement of equipment.
- 2.8.3.2. Obtain proper eye protection as required.

2.9. Pre-Deployment Considerations:

2.9.1. Review the deployment plan. Concept of operation, personnel, safety annex, and limiting factors (LIMFACS) are of primary importance.

2.9.2. Ensure an Operational Risk Analysis was accomplished by deployment planners and approved by the deploying commander.

2.9.3. If deploying to an established location confer with the previous deployment safety officer or non-commissioned officer (NCO) for updated information. This may require calling the safety office of the last unit deployed. If at all possible, call the person you are replacing while they are still at the deployed location. An overlap of personnel is not always afforded to the deploying person.

2.9.4. Get visibly involved in pre-deployment planning to include personnel, maintenance, LIMFACS, required simulator training, aircrew currencies, explosive site plans etc. Explosive site planning or contingency risk assessment must be accomplished prior to deployment (see AFMAN 91-201 para 1.4. Planning for Deployments). Once munitions arrive, it is too late. Determine other required safety personnel and get them involved in the planning process.

2.9.5. If explosives or missiles will be involved, ensure personnel who will handle them have received explosives or missile safety training and are properly qualified. MAJCOMs must ensure adequate explosives safety support is available at the deployment location during planning and beddown. The weapons representative should come from the service retaining overall safety responsibility at the joint location. Consider the differences in operations that may arise.

2.9.6. Examples of violations during loading and shipment include: failure to identify and mark containers; mixing incompatible munitions; corrosives improperly certified and mixed with unidentified hazardous lubricants; meals ready to eat (MRE) and undocumented insecticides on the same pallet; improper storage; and improper security. To ensure proper loading and shipment, take the following actions:

- 2.9.6.1. Train load teams to standard;
- 2.9.6.2. Secure all equipment stowed inside vehicles so it does not move during rough port handling and high seas or rough air turbulence;
- 2.9.6.3. Comply with AFIs and guidelines for airlift of hazardous materials;
- 2.9.6.4. Ensure vehicles have required tiedown shackles;
- 2.9.6.5. Keep personnel out from under equipment being lifted aboard ship;
- 2.9.6.6. Coordinate and enforce requirements for vehicle fuel levels;
- 2.9.6.7. Coordinate port of embarkation shipping requirements for bulk fuel or Petroleum, Oils, and Lubricants (POL) tank transporters; and
- 2.9.6.8. Ensure vehicle master switches are turned off immediately after loading.

2.9.7. Request the following information or consider:

- 2.9.7.1. Medical facilities available;
 - 2.9.7.2. Airfield familiarization training to include: runway, ramp, over-run condition, and foreign object damage (FOD) potential;
 - 2.9.7.3. Hung and hot ordnance and hot cargo areas and procedures;
 - 2.9.7.4. Combat Aircraft Parking Area (CAPA);
 - 2.9.7.5. Airfield lighting;
 - 2.9.7.6. Air traffic control and radar approach control (RAPCON) procedures and language limitations;
 - 2.9.7.7. Birdstrike/wildlife hazard potential;
 - 2.9.7.8. Midair collision potential;
 - 2.9.7.9. Alternate/Emergency/Divert airfields and procedures;
 - 2.9.7.10. Helicopter and rescue support;
 - 2.9.7.11. Tower and supervisor of flight (SOF) capabilities and procedures;
 - 2.9.7.12. Local obstructions;
 - 2.9.7.13. Climatic conditions and required flight gear, personal protective equipment and work clothing;
 - 2.9.7.14. Aircraft arresting barriers, cables (tape, configuration, rig time);
 - 2.9.7.15. Hydrazine response areas and procedures (if applicable);
 - 2.9.7.16. Ejection and jettison areas;
 - 2.9.7.17. Sufficiency of aircraft fire fighting and rescue response capabilities; and
 - 2.9.7.18. Hazardous materials storage and incident response capabilities.
 - 2.9.7.19. Identified on- and off-base safety threats to personnel;
 - 2.9.7.20. Housing and working facilities;
 - 2.9.7.21. Ground transportation plan, schedule, and vehicle support;
 - 2.9.7.22. Availability of portable radios and frequencies;
 - 2.9.7.23. Importance of adequate rest;
 - 2.9.7.24. Key personnel and agency listing;
 - 2.9.7.25. Message center and command post capabilities to include use of address indicator groups (AIGs);
 - 2.9.7.26. Local operating instructions and directives to include munitions restriction listing;
 - 2.9.7.27. Designated explosive routes;
 - 2.9.7.28. Emergency response capabilities and LIMFACS;
- 2.9.8. Disseminate mishap prevention material to units prior to deployment. This material should include "Lessons Learned" from mishap reports and other deployments.

2.9.9. Prepare a deployment safety kit. Equipment must be readily available at the deployed location. Specific MAJCOM and unit requirements should be considered. (See [Attachment 5](#).)

2.9.10. Coordinate with deployment navigation planning personnel for deployment and redeployment routing and ensure aircrews have:

2.9.10.1. All necessary flight plans and charts.

2.9.10.2. Refueling and divert data.

2.9.10.3. Terminal area arrival procedures.

2.9.10.4. Destination local area maps.

2.9.11. Brief the deployment commander on preparations and requirements which have been planned or completed.

2.9.12. When pre-deployment contingency and wartime deployment involve live munitions ensure the following procedures are considered. **NOTE:** Pre-deployment explosives safety site planning is not intended to duplicate existing explosives safety plans, however, it is to ensure proper planning and coordination between deploying and host or support units to safely beddown and employ combat forces: see AFMAN 91-201, para 1.4, Planning for Deployments.

2.9.12.1. Are procedures and information provided by the host unit to include:

2.9.12.1.1. A current and future base explosives location map?

2.9.12.1.2. A copy of all applicable joint-use and sole-use facilities with Net Explosives Weight (NEW) limits and other special provisions?

2.9.12.1.3. Climatic conditions?

2.9.12.1.4. Local regulations that may affect the deployed unit's operations?

2.9.12.1.5. Aerial photos, if available?

2.9.12.2. Have OPLAN requirements been reviewed?

2.9.12.3. Did weapons, flight, and ground safety personnel participate in pre-deployment site surveys?

2.9.12.4. Was coordination with host or support unit accomplished to ensure facilities and locations are designated for storage, buildup, and munitions loading operations?

2.9.12.5. Do plans address pertinent explosives safety information of all explosives operations and locations required for the contingency tasking?

2.9.12.6. If available, were any "Lessons Learned" reviewed and a copy taken to the deployed location? **NOTE:** Two web sites post this type of information. The Defense Environmental Network and Information Exchange service maintains an Exercise and Deployment Accident Prevention (EDAP) web site at <https://www.denix.osd.mil/denix/DOD/dod.html> with "lessons learned" information. A need to know with registration and login is required to gain access. The web site for AEF lesson learned is at <https://aefcenter.acc.af.mil/eafonlin/>.

Chapter 3

ARRIVAL AND BARE BASE SITE PREPARATION

3.1. Introduction. For a bare base to withstand a harsh environment and to keep occupants reasonably comfortable, the location of a facility or utility should be determined by analyzing the constraints and features of the area. Overall analysis should include the climatic constraints of solar radiation, temperature, precipitation, and prevailing wind. It should also include natural features of the ground surfaces, such as topography, ground cover, and drainage patterns. Follow-on construction, especially during the early stages of bare base erection, should be initiated so that the primary concerns are preparation of the airfield for its operational mission, establishment of water treatment plants, and beddown and protection of the inhabitants from the elements. As the bare base develops and its operational mission is assured, more emphasis can then be placed on creature comfort items and base support functions such as administrative offices, personnel, and dining facilities. (See AFPAM 10-219, Volume 5, *Bare Base Conceptual Planning Guide*, for additional information.)

3.2. Planning Guidelines. Civil Engineering (CE) will establish the planning criteria for the various phases involved for construction of major bare base facility and utility requirements. Remember, the operational mission is the top priority.

3.2.1. The site should be relatively flat terrain with minimal grading, brush or tree removal required. Consider the area for water drainage. If close to a lake or river, stay above the high water marks. Never place a tent in a canyon or dry creek bed because these areas may be subject to flash floods. Additionally,

3.2.1.1. Choose a site where blasting or large rock removal is not required.

3.2.1.2. Choose a site where major soil stabilization work is not required.

3.2.1.3. Repair of existing roads or construction of new may be required.

3.2.1.4. Repair of existing runways or construction of new may be required.

3.2.1.5. Plans for securing the base against intrusion may be required.

3.2.1.6. The identification of possible minefields should be considered.

3.3. Siting. Proper siting is critical during the planning phase of a contingency operation and safety issues must be considered. Factoring safety issues up front can alleviate many serious safety problems later in the deployment. Site selection is the most important step in building a Tent City or erecting a tent for a specific purpose. Consideration should also be given to future expansion of the site. Often times small changes in the base layout that are incorporated in the planning phase can make future expansion much easier and efficient. A poorly chosen site can have a direct negative impact on the mission. Safety, bioenvironmental engineering, public health, and civil engineering personnel should all actively participate in the site selection.

3.3.1. Whenever health, safety, or environmental factors exist, every effort will be made to ensure base layout distances comply with established guidance.

3.4. Arrival at Bare Base Locations. As deploying personnel arrive at the bare base location, CE will immediately begin to erect the base to meet mission requirements. This involves the erection and con-

struction and the operations and maintenance portions of maintaining the base. During the erection and construction portion of beddown operations, troops will hit the ground running. There is much to do and a short time to do it. Water points must be established, critical facilities must be erected and mission essential generators must be connected to them. Depending on their condition, airfield pavements may need to be repaired. Navigational aids, runway lighting, and aircraft arresting systems may have to be repaired, replaced, or installed so that aircraft can be received and launched. Additionally, site preparation must take place, electrical generation plants must be installed, and water and electrical distribution systems must be positioned as tents and shelters are being erected.

3.4.1. Initial Arrival Conditions. Expect poor conditions upon arrival at the deployed location. It may be, depending on the location, extremely harsh with the poorest of living conditions. Tents might not yet be constructed. The areas selected to construct tent cities and area roadways might need to be cleared of land mines. Sanitation facilities could be non-existent. Available latrines might be field constructed from lumber and burn barrels. Shower facilities and sinks with running water may not be available. Again, be prepared for the worst. There may also be no safety office established or other safety personnel present at a bare base location. However, each day conditions will improve.

3.4.2. Initial activities. Activities will be going on everywhere. Tent after tent will go up, planes will take-off and land constantly, and cargo will be marshaled fast and furiously. Heavy equipment operators may be challenged to keep the airfield clear of snow or repair severely deteriorated roads, along with a multitude of other things. Keep calm and do the job, identify problems but be prepared to offer solutions too. Seek the advice of others when needed, get out meet people and be seen. Displaying a willingness to help others where needed will gain the respect and acceptance of others. As time and the mission permits, help with details, put up tents, break down aircraft pallets, etc. Such initial actions may do much more for the safety program than would to cite how the operation is not in strict compliance with safety or AFI requirements. Remember, priorities will be setting up or maintaining an operational airfield and building up the base infrastructure.

3.4.2.1. It's a tough act to inform leadership of problems observed and point out how personnel could get hurt or how equipment could be damaged, but again, be prepared to offer possible solutions. Ask leadership how they want to handle serious safety violations that are identified. Be prepared to explain safety's role in the deployment—an advisor to leadership offering risk management solutions while trying to minimize loss of resources. Be willing to concede that while they should not become operational norms, certain hazards or risks under certain conditions may be necessary to accept. There is a lot to contend with and to further complicate matters; operating in a multinational or joint environment reporting to a sister service's commander is a possibility. Be flexible!

3.4.3. Initial duties upon arrival. It is important to ask questions and get involved with the operation upon arrival. If present, contact the superintendent of operations, the person in charge of Tent City (often referred to as the Mayor or Sheriff), local safety staff, fire department and command post and medical personnel, First Sergeant, and security forces. These agencies may offer assistance and identify other areas of concern not yet considered. This also informs them upon the arrival of the safety function, which can expedite coordination of their support if required. Establish phone, radio, and beeper equipment and include numbers or call signs as required. The following issues might warrant immediate consideration:

3.4.3.1. Adequacy of aircraft parking plan. Maintenance personnel may need assistance generating a parking plan (refer to paragraph 8.2.). A review of the plan should include evaluating:

- 3.4.3.1.1. Driving plan (arrows for driving direction);
 - 3.4.3.1.2. Letter and number rows;
 - 3.4.3.1.3. Taxi lines;
 - 3.4.3.1.4. Annotating restricted area entry control points;
 - 3.4.3.1.5. Posting NOTAMs if needed;
 - 3.4.3.1.6. Spots designated for explosives loaded aircraft and combat aircraft parking; and
 - 3.4.3.1.7. Distances between aircraft. Refer to Applicable MDS T.O.'s and AFI's. **NOTE:** Distances less than those required should be clearly identified on the parking plan and briefed to all personnel.
- 3.4.3.2. Coordination of the plan with LG, DO, SF and other interested agencies must be accomplished before reproduction. After reproduction is accomplished outline restricted areas and explosive clear zones in red. Distribution should include: flightline vehicles, Maintenance, Operations, Security Forces, and the Fire Department.
- 3.4.4. Depending on the nature of one's duties at the deployed location, it may be necessary to contact a number of different agencies or to accomplish a number of tasks while establishing the safety function. The following list is not all inclusive, but it is provided as a broad overview for consideration.
- 3.4.4.1. Safety. If safety support is already present at the deployed location, information on the following topics may already be established.
 - 3.4.4.1.1. Local hazards and restrictions;
 - 3.4.4.1.2. Emergency phone numbers (let them know how to contact you);
 - 3.4.4.1.3. Fuel spill procedures;
 - 3.4.4.1.4. Location, coordinates, frequencies and capabilities of closest hospital(s); and
 - 3.4.4.1.5. Local collision avoidance procedures;
 - 3.4.4.2. Base Operations (Airport Manager if at civilian airport). This agency may have information concerning the following issues.
 - 3.4.4.2.1. Any airfield surveys conducted;
 - 3.4.4.2.2. Hot brakes/noise sensitive areas;
 - 3.4.4.2.3. Local procedures, hazards and restrictions;
 - 3.4.4.2.4. Engine run restrictions (time of day and location);
 - 3.4.4.2.5. Hot gun area and suggested routes of flight (if necessary) and explosive/hazardous cargo loading areas; and
 - 3.4.4.2.6. FOD removal operations and BASH procedures.
 - 3.4.4.3. Air Traffic Control. This agency may have information concerning the following issues.
 - 3.4.4.3.1. Identification of unique local traffic procedures;
 - 3.4.4.3.2. Confirmation of International Civil Aviation Organization (ICAO) or local terminology for airspace/emergency handling;

- 3.4.4.3.3. HATR (Hazardous Air Traffic Report) Procedures; and
- 3.4.4.3.4. Review of airfield approaches.
- 3.4.4.3.5. Ensuring explosive site plans are in place and complied with.
- 3.4.4.4. Fire Department. This agency may have information concerning the following issues.
 - 3.4.4.4.1. Local procedures for requesting emergency response;
 - 3.4.4.4.2. Set up egress systems training (if necessary);
 - 3.4.4.4.3. Fire inspection procedures of facilities (if necessary); and
 - 3.4.4.4.4. Copies of the aircraft parking plan and aircraft pre-fire plans and information concerning types and amount of munitions on aircraft and in storage.
- 3.4.4.5. Munitions Officer. The munitions officer may provide the following:
 - 3.4.4.5.1. Storage area operating hours, security requirements, and points of contact;
 - 3.4.4.5.2. Identification of previously sited locations and confirmation of locations concerning all munitions or explosive sited areas in use.
 - 3.4.4.5.3. Copies of munitions transportation routes.
- 3.4.4.6. Weather. Local weather support may provide information on unusual weather patterns, sunset and sunrise data and severe weather notification procedures.
- 3.4.4.7. Additional actions for consideration:
 - 3.4.4.7.1. Post signs in and around facilities with names and numbers as POC to notify for hazard and injury reports. Also post (make available) AF Form 457, **Hazard Report**, AF Form 651, **Hazardous Air Traffic Report (HATR)**, and Mishap Worksheets (if applicable). Establish a bulletin board for extended deployments.
 - 3.4.4.7.2. Identify in writing, those individuals that will perform interim board member duties should a Class A or B mishap occur during the deployment. If more than one weapon system is deployed, members should be identified for each system present.
 - 3.4.4.7.3. It is extremely important for the flight safety officer to analyze aspects of the flying mission and review mission profiles in order to avoid unnecessary risks. Look at routes, deconfliction plans, altitudes, bump plans, communication plans, etc. Failure to advise the planners/mission commander of potential problems could result in unnecessary risk and possible injury to personnel or damage to equipment.
 - 3.4.4.7.4. Begin and keep a log of all discrepancies and corrective actions taken. Pass time sensitive information back to home stations immediately if such information can be used immediately to prevent problems for elements deploying soon, but not yet departed. Additionally, record and transfer all pertinent information to your home safety office when you return. As time permits begin a continuity program for replacement personnel. This will aid in the smooth transition from one safety person to the next. For continuity purposes, as a minimum record and track the information listed in [Attachment 6](#).
 - 3.4.4.7.5. Keep the mission commander informed of all safety discrepancies, injuries and reportable mishaps.

3.4.4.7.6. Ensure medical and police personnel contact safety functions with information regarding injuries and traffic accidents.

3.4.4.7.7. Ensure armory personnel have installed adequate clearing barrels at the armory, life support, dining facilities, etc.

3.4.4.7.8. Contact MWR personnel and work with them to ensure swimming areas, gyms, etc., are set up and operated in a safe manner.

3.4.4.7.9. Contact the deployed First Sergeant and become involved in the planning of off-duty activities, i.e.; sports, tours, etc.

3.4.4.7.10. Locate availability of medical support facilities and ensure mishap notification procedures are established and effective.

3.5. Hazards of Interacting With Indigenous Personnel. Rather than throwing surplus combat rations away; traditionally US troops will often give these rations to needy civilians. One report indicates that a child sustained injuries from an exploding bottle. The child had taken a self-heating device (allied heat-tab) from a package of combat rations and placed the heating device in a bottle with water. Steam formed and the bottle exploded injuring the child. Deployed personnel must recognize that certain items can be dangerous in the hands of children or other people who don't understand written package directions or who don't know proper uses for the item in question. Remind deployed personnel that:

3.5.1. Self-heating devices (MRE heaters) can be dangerous when used improperly;

3.5.2. Fuel tablets, and silicone crystals used for removing moisture, may be mistaken for food;

3.5.3. Water purifying tablets may be mistaken for medicine;

3.5.4. People may not be able to read or understand instructions written in English; and

3.5.5. The same extra caution used to keep potentially dangerous items away from children or other at risk people at home should be practiced while deployed. Don't give away combat rations.

Chapter 4

BARE BASE AND TENT CITY CONSTRUCTION AND GUIDELINES

4.1. Bare Base Assets. As deploying personnel arrive at the bare base location, they will be employed in a logical sequence and tasked to ensure the base is erected in such a way that it can meet its mission requirements during each stage of development. Employment at a bare base involves a two-part operation—erection and construction and operations and maintenance.

4.1.1. **Erection and Construction.** During the erection and construction portion of beddown operations, troops will hit the ground running and there will be a huge amount of activity all around. The landscape will literally be changing overnight. There is a lot to do. Water points must be established, critical facilities must be erected and mission essential generators must be connected to them. Depending on their condition, airfield pavements, navigational aids, runway lighting, and aircraft arresting systems may have to be repaired, replaced, or installed so that aircraft can be received and launched for operations.

4.1.2. **Operations and Maintenance.** The operations and maintenance portion of bare base employment is where personnel function much as they do at home stations, performing tasks required to keep the base operating day-to-day. However, the distinction between the erection and construction portion ending and the operations and maintenance portion starting is almost impossible to see. Often there is considerable overlap. For example, once stand-by generators have been connected to their facilities, they start receiving operational and maintenance checks, even though the electrical distribution system is still being installed in other areas of the base.

4.2. Deployment Packages. Primary bare base deployment packages consist of a housekeeping set; an industrial operations set, and an initial flightline support set, as well as follow-on flightline packages. One housekeeping set, one industrial operations set, and one initial flightline set support combined, are designed to support 1,100 people and one aircraft squadron. Each additional aircraft squadron deployed to that location requires one follow-on flightline operations package. Civil engineering and medical personnel will layout a basing plan that ensures mission accomplishment and health hazards are minimized. Address questions that arise during base build-up to these representatives.

4.2.1. **Housekeeping Set.** The housekeeping set is normally the first asset package to arrive. This set is assembled to take care of people needs. Construction of the cantonment area provides housing, feeding, and hygiene facilities for the troops. The housekeeping set facilities are mostly Tent Extendible Modular Personnel (TEMPER) tents. These tents are predominately used for troop billeting, and to house shower/shave units, field deployable latrines and field laundries. A kitchen is also made up of TEMPER tent construction. The housekeeping set provides a few additional TEMPER tents to be used as administrative facilities. The housekeeping set contains a limited number of hard walled shelters. Placement of these facilities to maintain sanitary and living areas separate from waste and runoff areas is important.

4.2.2. **Industrial Operations Set.** The second echelon of the typical deployment package is the industrial operations set. This set basically provides those base support facilities that enable the base to take care of itself. During this stage of development, additional TEMPER tents, hardwall shelters and other structures arrive to provide facilities for functions such as civil engineer shops, supply warehousing, vehicle maintenance shops, chapels, and field exchanges. Even though most facilities in this set are

TEMPER tents, additional general purpose shelters, expandable shelter containers, and tension fabric structures start to arrive. TEMPER tents are provided for administration, multi-purpose facilities. The frame supported tension fabric structure is a modular structure of between 4,000 and 8,000 square feet that is used for supply, vehicle maintenance, and packing and crating type facilities.

4.2.3. Initial Flightline Support Set. The next stage of bare base development involves the installation of the initial flightline support set. This set provides maintenance and operational support facilities with associated utilities for one aircraft squadron. The set contains mostly hard-walled shelters. Numerous expandable shelter containers provide many of the aircraft maintenance shops. General purpose shelters are used for AGE shops and multi-purpose functions such as squadron operations and briefing rooms. Functions requiring large work areas, like a propulsion shop, are housed in tension fabric structure shelters. There are a limited number of TEMPER tents included in this set, which support aircrew alert, fire operations, and crash rescue functions. To directly support flying operations, the initial flightline support set also contains airfield lighting and aircraft arresting systems.

4.3. Bare Base Construction . Civil Engineering personnel and Preventative Aerospace Medicine Personnel (PAM) will site and locate all facility groups and they will locate and erect all utility plants and systems. CE typically erects their own facilities and will furnish a minimum cadre of personnel to provide technical assistance to other base functions erecting their own facilities. Medical personnel often erect their facilities too. Careful consideration should be given to the siting and placement of functional areas and facilities.

4.4. Electrical Services. Bare base electrical packages consist of both high and low voltage systems. Electrical services should provide electricity for the operation of critical airfield lighting and communications systems first. Personnel operations and support services will follow. During the initial period, standard military mobile generators will supply most critical electric power. Where local electric power generation and distribution facilities are available, they may be used as a primary source of power; however, provisions must be made to provide back-up power for critical mission systems. All critical systems must be provided with back-up systems such that the loss of a single source of power will not endanger the operation of the facility.

4.4.1. Trained technicians must accomplish the design, operation, and maintenance of electrical systems. Only trained personnel should work with energized systems, and then only when required by applicable technical data or directives.

4.4.2. Proper grounding of an electrical system is essential to the safe operation of the system and will be accomplished by a qualified electrical technician. Grounding is accomplished by driving ground rods into the ground and providing a minimum 10 American Wire Gauge (AWG) bare copper wire from the ground rod to the device or system to be grounded. The spacing and depth of ground rods depends upon the resistance to ground to the earth at the site. In the absence of the capability to measure the resistance to ground and determine actual grounding requirements for the site, use a three-fourths inch diameter pipe or equivalent solid rod driven 10 feet deep or into the permanent ground water level, if known. Electrical continuity is essential in a grounding system; therefore, all connections should be clean and permanently bonded.

4.4.3. The design and application of grounding to an electrical system should be inherent in the system installation and not something that can be added at a later date. As previously discussed, electrical system trained technicians must accomplish design and installation. There are, however, two types of

grounding systems not generally associated with the electrical systems, which are necessary for the safe operation of an air base. These systems are lightning and static electricity protection.

4.4.3.1. Although not a primary consideration for initial construction, lightning protection should be considered for protection of essential facilities and buildings. (Contact the Weapons Safety Manager and reference AFMAN 91-201 for explosive operating and storage facility lightning protection systems.) Essential or high-risk facilities or buildings include fuel storage areas and ammunition or explosive materials storage or handling. Protection for these facilities can be accomplished by providing grounded air terminals along high points and the perimeter of buildings or a series of high towers located beyond a given area to be protected. The essential feature of a lightning protection system is that air terminals, conductors, and ground rods be large enough to provide a path of least resistance to ground for a given area.

4.4.3.2. Static electricity protection is a primary consideration whenever there is a potential of static electricity build-up and a discharge or sparking could injure personnel or cause ignition of explosive materials. Static grounding is essential for portable, normally ungrounded motor-driven equipment. Primary considerations include Petroleum, Oil, and Lubricants (POL) facilities, weapons systems, communications facilities, and airplane parking and maintenance facilities.

4.5. Airfield Lighting. If installation of an airfield lighting system is required, there are portable airfield light sets that can be installed by contingency forces. Airfield lighting kits can provide threshold and runway edge lighting for a bare base runway. Portable airfield lighting is highly reliable and identical to airfield lighting systems used at military and civilian airports throughout most of the world. In the event of a deployment to a bare base where the airfield lighting is inoperative, portable kits can be used to repair the existing systems or, if damaged beyond repair, to set up a completely independent system. Where operation of the airfield at night is necessary, or a possibility, provisions for alternate lighting systems must be provided for in advance. Alternate lighting systems consist of prepositioned materials and equipment for emergency use. This alternate lighting can be used in the absence or failure of electrically powered systems. Advance planning and provisions for alternate systems such as fires, use of vehicle lighting, and driving generators from other motor sources are all a part of the initially deployed mission forces and fall under the category of expedient construction.

4.6. Water Distribution. It is absolutely essential that a water source, which can be made potable, is available for bare base operations. There are many sources, uses, treatment, and distribution considerations for water. Civil engineers ensure bottled or treated water is available. Bioenvironmental engineering or PAM team approves water for consumption and potability for deployed personnel.

4.6.1. Sources. In non-arid environments water is generally readily available in streams, rivers, and lakes. This water usually requires only clarification and disinfection to make it potable. Groundwater (well-water) may also be abundant. Many times the only treatment groundwater requires is disinfection. However, groundwater near industrial areas should be tested for the presence of hazardous wastes. All water must also be examined for the presence of human waste. The single most important characteristic of arid areas is the lack of water. Surface water is limited to a very few rivers and intermittent streams that benefit from sparse rainfall. Except for limited areas, primarily along the coast, groundwater is also scarce and is generally unfit to drink because of the dissolved solids content. Because of widespread unsanitary practices, all water in underdeveloped countries, no matter what the source (this includes ice obtained from local vendors) should be considered contaminated with disease causing organisms, until proven otherwise. A contingency force must be prepared to produce its own

potable water from any available source, and must constantly strive to conserve this mission essential resource, regardless of the water's quality and ultimate use. Seawater obtained offshore at a location removed from a sewage outfall is normally relatively clean. It is very salty and contains suspended particles of sand and bacteria. Seawater may be used without adverse effects for electrical grounding, housekeeping tasks, firefighting (not in fire vehicles), some construction tasks, showering, and laundering. It should not be used where continued use could corrode critical metal surfaces. When used for showers, laundries, and personal hygiene purposes, it must be disinfected.

4.6.2. Treatment. The primary water treatment equipment item used in bare base operations is the Reverse Osmosis Water Purification Unit (ROWPU), which can produce potable water from nearly any source of water. The ROWPU purifies water by first removing large suspended material from the water in a multimedia filter. The remaining suspended material is removed in a cartridge filter. The water is then pumped at high pressure (up to 950 psi) to reverse osmosis membranes. The membranes allow about 1/3 of the water to pass through them. Since very little of the dissolved solids in the water can pass through the membranes, the water that has passed through is desalinated. The dissolved solids concentrated in the water that does not pass through the membranes produce a brine water discharge. The brine water discharge flow is typically twice the product water flow. Over the course of a day at a large water treatment plant many gallons of brine water will be produced. Sometimes this by-product can be put to good use in construction or dust control or stored for fire fighting. Usually, however, more brine will be produced than can be used effectively; therefore, some additional, alternate methods of disposing this waste material must be developed.

4.7. Petroleum, Oil and Lubricants (POL) Sites. The preservation of fuel quality, minimization of losses, air pollution control, and safety of operation are important considerations in the design and construction of fuel storage facilities. Storage tanks are required to provide an operating and reserve supply of fuel at almost all Air Force bases. At certain air bases, because of the proximity of the enemy lines, the predicted enemy threat, or the mission duration of the airfield, it may not be practical to store POL products at forward or battle area airfields. Aviation and ground POL products are normally stored in 55-gallon drums, collapsible bladders, or steel-welded or bolted tanks.

4.7.1. Steel 55-gallon drums are used for fuels and lubricants. For storage, drums are segregated by type and grade of fuel and stacked horizontally (on sides) in rows. Drums should be placed end-to-end in double rows with closures (bungs and vents) facing outward.

4.7.2. Synthetic-rubber-impregnated fabric containers may be used for storage of liquid fuels. Containers should be installed on level ground, free of rocks or other sharp objects, and surrounded by dikes or ditches capable of holding 125 percent of the container capacity.

4.7.3. Storage site preparation may consist of grading, berming, and installing a 3-inch dike drain pipe with gate valve. All fuel bladders, regardless of size and content, will be bermed; all fuel bladder dikes will be fitted with a protective liner to prevent environmental damage and contamination. Other considerations include the following:

4.7.3.1. Is the site located on level ground but contoured in such a way that the flow is directed away from congested areas in the event of a leak?

4.7.3.2. Are low-lying or depressed areas avoided for storage since hazardous vapors are likely to remain present in some cases?

4.7.3.3. Are bulk tanks located 50 feet from open flames or other spark-producing devices?

- 4.7.3.4. Are fuel storage areas equipped with dikes that are sufficient to retain all liquid contents of drums stored?
- 4.7.3.5. Are fire warning signs posted on all four sides of fuel storage areas?
- 4.7.3.6. Are drip pans available for dispensing stations?
- 4.7.3.7. Are caps on fuel cans or Jerry-cans screwed tight to prevent leaks?
- 4.7.3.8. Are leaking fuel cans removed from service?
- 4.7.3.9. Are spills cleaned up immediately?
- 4.7.3.10. Are open tanks or drums grounded?
- 4.7.3.11. Is the area maintained in a neat and orderly manner to facilitate efficient operations and inspections?
- 4.7.3.12. Are fire extinguishers properly located in unobstructed areas? Are they checked periodically for serviceability?
- 4.7.3.13. Is the fuel storage area located and sited in an area IAW explosive safety standards?

4.8. Munitions Storage Areas. Area preparation may consist of siting, grading, constructing berms, and sandbagging. Construction of storage bunkers will likely begin as soon as possible after other essential tasks are completed. In the interim period, munitions should be stored in properly segregated and if possible properly barricaded locations IAW AFM 91-201. Also, actions for providing a grounding system for the munitions area consisting of ground rods and connecting grid system should be accomplished. See [Chapter 9](#) for additional information.

4.9. Medical Units. Medical units should be sited in lower threat areas of the base, but near combat support group services facilities (billeting, showers, laundry).

4.10. Storage and Supply Areas. Sites should be easily accessible to vehicles and Material Handling Equipment to facilitate the marshalling of supplies. See [Chapter 7](#) for additional information.

4.11. Showers and Latrines. Areas should be central to the billeting tents but at least 100 feet away for sanitary reasons. Other considerations include:

- 4.11.1. Are water heaters located on metal or insulated floors--not directly on wooden floors?
- 4.11.2. Does the sewer drainage system drain freely and away from living areas to prevent back-ups and subsequent health hazards?
- 4.11.3. Is heater temperature set low enough to prevent scalding?
- 4.11.4. Are heating units and electrical wiring located well away from shower areas?
- 4.11.5. Are fire alarm systems located in or near shower and latrine tents?
- 4.11.6. Are there fire extinguishers located in or near the shower and latrine tents?
- 4.11.7. If shower tents are elevated (on back of semi-trailers) are handrails installed with the stairway?
- 4.11.8. Are shower and latrine facilities located down slope of potable water sources if possible?

4.12. Laundry Sites. Locate central to billeting tents but far enough away so generator noise can be shielded from sleeping tents.

4.13. Kitchen and Dining Facilities. Areas should be centrally located in a dry area, which will not pose an increased health threat, i.e. well away from trash collection areas. Other considerations include:

- 4.13.1. Are burner-refueling areas located 50 feet from tents and facilities and lighting and generator equipment?
- 4.13.2. Is the accumulation of grease on tent surfaces monitored and periodic cleaning accomplished?
- 4.13.3. Are disposal areas for grease at least 8 feet from the tent?
- 4.13.4. Are a minimum of two fire extinguishers provided for cooking areas? (Extinguishers should be located and unobstructed at the entrances to the cooking areas.)
- 4.13.5. Is the electrical distribution panel located at least 6 feet from the kitchen tent?
- 4.13.6. Are electrical generators positioned at least 15 feet from tent walls? (Fuel tanks should be positioned as remotely as possible from generators and diked with fuel lines protected.)
- 4.13.7. Are portable hot water heaters set at least 20 feet from the dispensing area?
- 4.13.8. Are adequate unobstructed aisles and exits maintained?
- 4.13.9. Are gasoline ovens located away from tent walls (3 foot minimum)?
- 4.13.10. Are fans or other means available to exhaust carbon monoxide fumes generated by stoves?
- 4.13.11. Are ovens, immersion heaters, and stoves insulated from wooden floors?
 - 4.13.11.1. Are the stovepipes to these units insulated from the tent and wooden floors?
- 4.13.12. Are water heaters located on metal or insulated floors and not directly on wooden floors?
- 4.13.13. Are wooden grease traps located away from ignition sources?
- 4.13.14. Are lighting fixtures guarded (globe over bulb or florescent tube shielded) over food servicing line to protect food from broken glass?
- 4.13.15. Are floors kept clean and grease free?
- 4.13.16. Are paper and waste products properly disposed?
- 4.13.17. Are cutlery and other sharp kitchen implements guarded?
- 4.13.18. Are storage areas kept clean and neat?
- 4.13.19. Are heavy items (cans, jars, pots, etc.) stored on lower level shelves?
- 4.13.20. Do dining hall personnel wear steel toe shoes?

NOTE: Refer to public health personnel for guidance in sanitation.

4.14. Common Facilities. Most deployment packages consist of the Tent Extendible Modular Personnel (TEMPER) tent, small and medium shelter systems, Expandable Shelter Container (ESC) and General Purpose (GP) shelter. These are used to provide personnel living quarters and work centers. Those workers that do not have a basic knowledge of bare base assets and their function should seek assistance from civil engineers or other certified personnel before attempting to erect facilities without the proper training

or guidance. Civil engineers may need to erect all GP shelters--these are probably too complex for most base organizations to handle and training is not readily available. Having a small cadre of personnel, knowledgeable on TEMPER tent and ESC erection techniques, available to assist the base populace is advisable. There will be occasions where untrained people will be faced with facility erection tasks and without supervisory and instructional guidance these individuals may injure themselves or others and damage assets. At no time should the general base populace attempt utility connections, as basic as they may be, to facilities. The potential for damage to system components and harm to both base personnel and electrical crews is too great. Of the assets discussed here, TEMPER tents are by far the most numerous, followed by the ESC and then the GP Shelter.

4.14.1. TEMPER Tents and Small Shelter System (SSS): The TEMPER tent and the SSS are soft-walled shelters consisting mainly of a synthetic material fabric supported by an aluminum frame structure. Their modular construction allows many different configurations. They are designed for use in desert, tropical, and temperate climates and come in both desert tan and forest green colors. Utility support includes electrical service for lighting and convenience outlets and provisions for heating and cooling using the bare base environmental control unit or the field deployable environmental control unit.

4.14.1.1. The TEMPER tent is easy to erect and all base personnel should be able to erect this shelter or at least be prepared to provide assistance given proper instruction and guidance. Proper safety procedures during the erection of all facilities will be strictly enforced. Work gloves are recommended to protect workers hands while they are engaged in TEMPER tent construction. **NOTE:** Driving stakes in hardened ground may require the use of sledgehammers or air-powered hand tools. Additional PPE, to protect the workers' eyes and hearing may be required in these situations.

4.14.1.2. TEMPER tents should not be placed in a location subject to jet blast or high winds.

4.14.1.3. When erecting the tent personnel should be careful to avoid pinching hands or fingers. Workers need to avoid the hinges at ridge or eave locations when holding or lifting the tent frame.

4.14.1.4. Lifting the tent requires several people lifting in unison; team lifting should be stressed so that one person gives the signal for all team members to raise the tent. Proper lifting techniques, squatting and using the legs and not the back, will be used in order to avoid back injury. It is essential that a tent side be raised or lowered smoothly and evenly; failure to do so can damage the tent's frame. **NOTE:** Under windy conditions extra personnel may be needed to erect and hold the tent until the frame can be firmly staked.

4.14.2. General Purpose Tents. General purpose tents may still be used on some deployments and are described as either GP medium or GP large tents. The GP tent is a soft-walled shelter of canvas or synthetic fabrics supported by poles. Often GP tents will be erected over a frame structure constructed of lumber (Hardback). Utility support for these tents includes electrical service for lighting and can include convenience outlets and provisions for heating through the use of fueled heater units.

4.15. Other Factors for Facilities. Several factors should be considered during all phases of Tent City construction. These include:

4.15.1. Will streets and tents be marked with signs? (Assists in identifying emergency location for responding medical, fire, security, and safety personnel.)

- 4.15.2. Is the Tent City sited outside of munitions clear zones and runway approach and departure zones? Is it logistically laid out to avoid maze-type effects?
- 4.15.3. Was the site coordinated with the respective weapons safety and airfield management personnel?
- 4.15.4. If waivers are required, are they approved prior to continuation of planning at the site?
- 4.15.5. Do operations facilities (maintenance support tents, operations tents, etc.) planned for the flight line area meet the airfield clearance criteria from taxiways, runways, aircraft parking ramps, engine-runup pads, etc.?
- 4.15.6. Is a section of the Tent City designated for aircrew only? This area should be a 24-hour crew rest area to allow for around the clock air operations.
- 4.15.7. Does the Tent City layout provide for fire lanes throughout the site that:
 - 4.15.7.1. Are adequate for emergency response vehicles to get through?
 - 4.15.7.2. Provide access from two unobstructed directions?
- 4.15.8. Are fenced-in areas planned with emergency gates to permit ready access by fire-fighting equipment and also to provide for safe evacuation in case of emergency?
- 4.15.9. Is there a plan for fire fighting outside tents?
- 4.15.10. Are exterior area lighting requirements specified and are they adequate for security and safety during night operations? If not, have suitable exterior light fixtures and electric boxes been ordered?
- 4.15.11. Are vehicle parking areas planned?
- 4.15.12. Is the fuel truck parking area separated from other vehicle parking and 50 feet from spark-producing devices?
- 4.15.13. Has a diked fuel storage area (MOGAS, diesel, and kerosene, if required, for heaters and cook stoves) been planned?
- 4.15.14. Are “Hazardous Areas”, “No Smoking”, and Fire Symbol signs available?
- 4.15.15. Is the fuel storage area sited 50 feet from flame or spark producing devices?
- 4.15.16. Have fire alarms (bells, metal rods, or triangles) been placed throughout the area? Are plans for fire protection and emergency evacuation established?
- 4.15.17. Has a communication system been established? This system should address recall or emergency notification of personnel. In the event of an emergency are personnel informed so that they know where to assemble to ensure accountability?

4.16. Tent Heaters: Improper fueling of tent heaters often results in fires. Deployed personnel must know necessary precautions to avoid starting a tent fire when refueling heating devices. On one deployment contractor personnel attempted to refuel a hot kerosene heater with MOGAS inside a laundry tent, the tent caught fire and was completely destroyed. Personnel that will operate tent heaters must be trained on their use—including civilian and contracted personnel. Mark fuel cans by type of fuel and store different types of fuel in separate locations. In some situations it may be necessary to refuel heaters outside of tents and not refuel heaters when they are hot.

4.16.1. Preway 70,000 BTU Tent Heater. The Preway radiant type heater operates on diesel fuel or JP-8. Type of fuel for use will be confirmed prior to operation of the heater. Use of improper fuel can result in detonation of the heater. Fuel is stored and fed from a standard 5-gallon Jerry can hung on the side of the heater frame. Designed for floor installation, the heater must be installed and rest on non-combustible material. Stovepipe sections run from the heater through the roof of the tent. Keep combustible materials at least 18 inches from the stovepipe unless the pipe is shielded by metal or other approved material. It is important to ensure the heater is completely level to permit fuel flow to the heater.

4.16.2. If heaters are used, personnel should be aware of the following:

4.16.2.1. Tents **MUST** be occupied when heaters are on.

4.16.2.2. The last person leaving the tent must turn the heater off. However, the ranking person is ultimately responsible.

4.16.2.3. Unless trained, occupants **WILL NOT** attempt to repair the heater.

4.16.2.4. Trash or other materials will not be thrown into and burned in the heater.

4.16.2.5. The heater should not be operated on the highest setting.

4.16.2.6. The heater will not be used for drying personal effects and combustible items will not be placed on the heater.

4.16.2.7. All combustible objects are to be kept at least 36 inches (3 feet) from the heater.

4.16.3. The following actions should be taken to ensure stovepipe safety:

4.16.3.1. Are stovepipes tightly joined along the vertical seam (this is to mitigate carbon monoxide poisoning hazards)?

4.16.3.2. Are stovepipe sections tightly joined together, and if held together by rivets, are the rivets of a material other than aluminum?

4.16.3.3. Do stovepipes have weather caps that are well seated in the top of the stack?

4.16.3.4. Does the stack extend above the top of the tent to eliminate the possibility of fire?

4.16.3.5. Are stovepipe stacks firmly anchored with guy lines in the event of strong winds?

4.16.3.6. Are tent liners properly tied off around stove pipe openings so the liner does not touch the stove pipe?

4.16.3.7. If ventilation is questionable, a carbon monoxide detector should be placed in each tent.

NOTE: Before installing and operating any heater inside a tent, ensure the proper authority approves its use. Items, such as the M1941 heater and locally procured kerosene type heaters can create a severe fire hazard when improperly used and maintained. Do not use the Yukon Stove (M-1950) in extendible modular tents.

4.17. Office and Billeting Tents:

4.17.1. Is there a fire extinguisher and serviceable smoke detector in every tent? **NOTE:** Providing carbon monoxide detectors in tents should also be considered.

4.17.2. Are wooden floors constructed so that they are well supported, level, and free of large cracks?

- 4.17.3. Are tents well-staked in case of high winds?
- 4.17.4. Are tent liners properly installed?
- 4.17.5. If installed, do wooden tent doors swing outward so as not to impede emergency egress from the tent?
- 4.17.6. Electrical installation considerations:
 - 4.17.6.1. Are electrical line installations to the tent constructed to prevent a tripping hazard?
 - 4.17.6.2. Are electrical line splices properly wrapped and waterproofed to prevent shocking hazards or arcing (fire) hazards?
 - 4.17.6.3. Are waterproof electrical boxes used in exterior areas where required?
 - 4.17.6.4. Are waterproof exterior fixtures used for exterior lighting?
 - 4.17.6.5. Are fixtures suitably protected from the elements to prevent shocking or arcing?

4.18. Occupant Responsibilities:

- 4.18.1. Tent Leader:
 - 4.18.1.1. Do senior ranking members of each occupied tent or module understand they will be the tent leaders and will ensure rules are understood and followed?
 - 4.18.1.2. Does the tent leader ensure each facility has a working smoke detector mounted at a high point in the tent and clear from the air ducts or obstruction? (Test smoke detectors weekly.)
 - 4.18.1.3. Does the tent leader ensure each facility has a working fire extinguisher at a door or at a center pole? (Tampering with fire extinguishers is prohibited.)
 - 4.18.1.4. Do tent leaders ensure quiet hours are established and followed (i.e., 2200 to 0600)? (Respect and courtesy for your neighbor's desires and rest requirements are essential for mission requirements and safety. Shift workers usually reside in the community and may require alternate quiet hours.)
 - 4.18.1.5. Does the tent leader ensure all partitions are fully removable, to ensure the tent can be utilized in surge conditions?
 - 4.18.1.6. Is an unobstructed, 32-inch wide (minimum) center aisle from the front door to the back door provided for occupants to reach the exit from any partitioned area.
 - 4.18.1.6.1. Partitioned areas must have an unobstructed, minimum, 28-inch wide opening to egress to the center aisle.
 - 4.18.1.6.2. Plywood partitions must conform to fire safety requirements and be approved and installed by CE.
 - 4.18.1.6.3. Soft partitions must be constructed so they can be pushed aside for emergency egress. (They cannot be rigidly fastened in place.)
 - 4.18.1.7. Does the tent leader ensure tent electrical systems, including light sets, are not used in any way as support for partitions? (Nothing may be suspended from light set wiring. In addition, partitions must be constructed so light bulbs are not within 4 inches of the partition.)

4.18.1.8. Does the tent leader ensure supplemental heating devices, such as space heaters are not used, unless approved by CE?

4.18.1.9. Does the tent leader ensure extension cords are rated at 15 amps or higher and equipped with a grounded three prong plug?

4.18.1.10. Does the tent leader ensure light bulb wattages do not exceed recommended maximums?

4.18.1.11. Do tent leaders and occupants understand Medical, Services, Fire, and Safety officials reserve the right to enter and inspect any unit for safety, health, sanitation, and quality of life concerns as well as for the removal of contraband or restricted items? Do they also understand that discrepancies must be corrected within 24 hours?

4.18.2. All occupants will:

4.18.2.1. Comply with absolutely no open-flame or hot plate cooking.

4.18.2.1.1. Use only approved microwaves and coffee makers, if unsure contact engineering or fire prevention personnel.

4.18.2.1.2. Keep food in sealed containers or refrigerators and stored off the floor.

4.18.2.1.3. Not leave open food containers and garbage inside the tent.

4.18.2.2. Not smoke in any facility. (Dispose tobacco products only in approved receptacles, such as self-closing butt cans.)

4.18.2.3. Keep an exit-way from front to back door clear of obstructions? (The exit-way must remain clear for each occupant to exit the facility.)

4.18.2.4. Not do self-help electrical work unless the work is accomplished by qualified personal and CE authorized.

4.18.2.5. Not have open bonfires, pit fires, or standing barrel fires unless authorized by the installation Fire Marshal. Open flames must be approved containers and never left unattended.

4.18.2.6. Not store combustible material in tents or modules.

4.18.2.7. Keep garbage cans emptied and free of overflow. (Keep lids on cans. Residents are responsible for emptying contents into dumpsters daily in order to reduce health risks and pest infestation.)

4.18.2.8. Keep outdoor BBQ grills at least 15 feet from any structure. Dispose of coals and ashes into specially marked and designated trashcans, douse with water, and allow 8 hours to cool before placing into dumpsters. (Do not dump ashes or coals on the ground, burning coals that have been barely covered with sand or soil and left unattended, have caused injury to people.)

4.19. Fire Prevention:

4.19.1. Is a nighttime fire watch program established and coordinated with fire department personnel for tent areas?

4.19.2. Is a daily walk-through of tent areas accomplished by the Fire Marshal and safety officials?

4.19.3. Smoking Areas:

4.19.3.1. Are smoking areas properly identified by and approved by the Fire Marshal?

4.19.3.2. Are suitable receptacles available for discarding smoking materials?

4.19.3.3. Is a serviceable fire extinguisher available?

4.20. Camouflage:

4.20.1. Successful camouflage is the concealing of installations and activities by hiding, blending, and disguising an object or activity of military significance to deceive observers on the ground or in the air.

4.20.2. The following are potential hazards that can result from improper installation or improper use of camouflage materials or netting.

4.20.3. Effective placement of camouflage netting often requires climbing on top of buildings or other areas not normally used, even by the people most familiar with the facility. Proper sized ladders will be used when placing netting on elevated surfaces.

4.20.4. Use adequate procedures and safety equipments to protect workers from falls during placement of camouflage netting from buildings roofs.

4.20.5. Tent leaders will ensure camouflage netting is erected outside tents only. It must be removed by the user or occupant if it interferes with maintenance or construction work within Tent City. It must not:

4.20.5.1. Obstruct fire lanes, overhangs, or main walkways;

4.20.5.2. Be tied to any electrical panel or box; or

4.20.5.3. Be attached at any sheet metal screws, metal flashing, or roof overhang.

Chapter 5

DEFENSIVE FIGHTING POSITIONS (DFP)

5.1. General. A defensive fighting position is a structure from which troops engage the enemy with direct and indirect fire weapons. The positions provide necessary protection for personnel, yet allow for fields of fire and maneuver. A protective position protects personnel and (or) material not directly involved with fighting the enemy from attack or environmental extremes. DFPs can be constructed from a number of available materials; steel, lumber, wood, concrete, etc. Construction often entails some earth-work such as digging a trench or other below ground excavation. The collapses of poorly constructed DFPs have caused serious injury to personnel and in some cases materials used, like sand filled bags and lumber, can weigh thousands of pounds. It is absolutely imperative that engineering personnel design and construct DFPs. Listed below are several factors that should be considered. Also refer to US Army Field Manual 5-103, *Survivability*, for additional information.

- 5.1.1. Do supervisors ensure alternate entrance and exit doors to buildings are not physically blocked or barricaded by the location of DFPs?
- 5.1.2. Are DFPs constructed away from locations that may put the defender's personal safety in jeopardy, (away from fuel tank vents, edges of roofs, high voltage equipment, etc.?)
- 5.1.3. Are DFPs, built on top of structures such as aircraft shelters, blastwalls, or towers, equipped with appropriate guardrails or barriers to prevent personnel from falling?
- 5.1.4. Are wooden boards used in shelters checked for structural integrity and adequate size for the bearing load (no rotten wood)?
- 5.1.5. Does DFP construction compensate for unlevel ground?
- 5.1.6. Do workers ensure the following materials are NOT used?
 - 5.1.6.1. Plywood less than three-fourths of an inch in thickness;
 - 5.1.6.2. Warped, bent, or brittle wood or metal;
 - 5.1.6.3. Materials saturated with chemical residue (fuel, oil, etc.);
 - 5.1.6.4. Used tires that are wet inside;
 - 5.1.6.5. Building material with exposed nails and jagged or sharp edges.
- 5.1.7. Do DFPs have the following attributes:
 - 5.1.7.1. Wall material must be overlapped in two directions or otherwise interlock.
 - 5.1.7.2. Walls must not lean outward or inward.
 - 5.1.7.3. Wall thickness must be a minimum of two sand bags laid flat side-by-side or the length of one sand bag.
 - 5.1.7.4. Roofs shall not deflect downward greater than 1 inch.
 - 5.1.7.5. When railroad ties, runway matting, planks, or similar material is used for roof construction, walls must be "L"-shaped, four sand bags thick, and interlocked at the corners.

5.1.7.6. Roof support stringers must be of adequate design and construction to support intended weight.

5.1.8. Water-repellent material, i.e., plastic sheeting, can be used as long as it does not affect the stability of the DFP walls or roof.

5.1.9. When DFPs are constructed on top of facilities do they meet the following requirements:

5.1.9.1. Civil engineers have determined that the additional weight of DFP will not damage the facility.

5.1.9.2. Access to the DFP is clear of obstructions.

5.1.9.3. DFPs are no closer than 6 feet from any edge of the roof.

5.1.10. When DFPs are located 4 feet or more off the ground and no guardrail is installed, precautions need to be taken to prevent troops from mistakenly walking off the edge of the facility. For example: ensuring the DFP entrance and exit are away from the edge of the facility.

5.1.11. When DFPs are located 4 feet or more off the ground with no permanently fixed stairs, portable ladders are acceptable substitutes. Portable ladders for DFPs may be commercial or locally built. **NOTE:** For DFPs less than 4 feet off the ground, steps may be constructed. Each step shall not exceed 8 inches in height, will be at least 9 inches deep to allow for safe and secure footing with a maximum of four steps.

5.1.12. Reconstruct DFPs when:

5.1.12.1. Roofs deflect downward more than 1 inch.

5.1.12.2. Walls, entrances, or gunport openings lean visibly in or out.

5.1.12.3. Ladder or step conditions exist which are not in compliance with the guidelines in paragraph [5.1.11](#).

5.2. Commander's Responsibilities:

5.2.1. Ensure DFPs are maintained and improved as necessary.

5.2.2. Provide materials.

5.2.3. Supervise construction.

5.2.4. Inspect periodically.

5.2.5. Plan and select fighting-position sites.

5.2.6. Get technical advice from engineers as required.

5.3. Safety Tips:

5.3.1. Dig excavations as deep as possible. Don't build above-ground unless absolutely necessary.

5.3.2. Don't use sand or sandbags for overhead structural support.

5.3.3. Maintain, repair, and improve positions continuously.

5.3.4. Inspect and test position safety daily, after heavy rain, and after receiving direct and indirect fire.

- 5.3.5. Revet (face with masonry or other material) excavations in sandy soil.
- 5.3.6. Don't drive vehicles within 6 feet of a position.
- 5.3.7. Interlock sandbags for double-wall construction and corners.
- 5.3.8. Check stability of wall bases. Don't forget lateral bracing on stringers.
- 5.3.9. Don't put personnel in marginally safe bunkers.
- 5.3.10. Don't overfill sandbags; fill them approximately three-quarters full.
- 5.3.11. Built-Up Positions:
 - 5.3.11.1. Use only when absolutely necessary (e.g., bedrock prevents excavation).
 - 5.3.11.2. Use appropriate construction and structural material.
- 5.3.12. Soil Considerations:
 - 5.3.12.1. Remind personnel that rain, vibration, and vehicle traffic will weaken the soil. Also, open excavations will not hold a side wall; they cave in and collapse.
 - 5.3.12.2. Maintain position by periodically inspecting revetment walls, cover, waterproofing, and slopes. If bunker walls or roofs are bowing, reinforce them or abandon them. Inspect stringers for wear, cracks, bends, and bows. Replace if necessary.
 - 5.3.12.3. After an artillery or missile barrage—test, inspect, and repair position.

5.4. Exercises. Are exercise fire-fights on top of certain areas prohibited as determined by the controllers or exercise evaluation team (EET) members to prevent personnel from falling and are existing sandbag shelters checked for structural integrity prior to start exercise (STARTEX)?

Chapter 6

RAPID RUNWAY REPAIR (RRR)

6.1. General . Engineering forces require proper equipment and adequate personnel to achieve expedient repairs to war damaged airfield pavements. To fulfill this requirement, the Air Force has developed equipment sets for accomplishing airfield pavement repairs. Procedures for crater repair using several types of fill material as well as use of folded fiberglass mat (FFM) and AM-2 mat are involved in RRR. Filling craters and repairing a taxiway or runway can be hazardous work even in peacetime. Some of the potential hazards involved with such operations are listed in this chapter.

6.2. Basic RRR Set. The basic set was developed by the Air Force to provide an expedient bomb damage repair capability to theater air bases. The equipment in this set is designed to support the repair of three 50-foot bomb craters with AM-2 matting within a 4-hour period. The basic set also supports the folded fiberglass mat (FFM) method using the same criterion. The basic RRR set (either AM-2 or FFM) is currently in place at most high-threat theater main operating bases (MOBs) and may or may not be supplemented with additional components.

6.3. Components of the Aluminum Matting (AM-2) RRR Patch Kit:

6.3.1. AM-2 aluminum matting is hand-assembled and anchored over the crater, which was prepared with a layer of crushed stone.

6.3.2. These kits contain all required tools and materials needed to assemble the patches:

6.3.2.1. Mats—The large mat is 2 feet by 12 feet by 1 1/2 inches and weighs 144 pounds. The small mat (half mat) is 2 feet by 6 feet by 1 1/2 inches and weighs 72 pounds.

6.3.2.2. Starter Keylock—A narrow strip of matting 4 inches wide with two male edges. It comes in three lengths and its function is to allow bi-directional installation of matting.

6.3.2.3. Locking Bar—The matting is locked together with the locking bar, which is 2 feet by 3/4 inches by 3/16 inches. It is inserted at the leading edge of the joint. The locking bars are also used as temporary spacers for aligning mats by inserting the bar in the top of the groove between panels.

6.3.2.4. Towing Bar Tube—This is a 2-foot long hollow tube with a mat end joint connection on one side. The tube is connected to the mat ends and is used for pulling matting over a crater.

6.3.2.5. Starter Towing Bar Tube—This tube is installed on the mat ends at the starter keylock. This is 1 inch longer than the normal towing tube. This is to compensate for the width of the starter keylock.

6.3.2.6. Mandrel—A steel rod that is inserted in the towing tubes and secured by the towing bar stop and end caps. It also keeps the mat aligned during pulling of the mat.

6.3.2.7. Tow Clamp—A yoke-shaped device of two parts that is bolted together to enclose the towing tube for pulling.

6.3.2.8. Ramp—This is a 6-foot section of tapered matting that attaches to the male side of the mat. The ramp provides a smooth transition from runway surface to matting surface.

6.4. Folded Fiberglass Mat. The second repair method uses the FFM. This procedure, which is currently the primary repair method, involves the installation of an anchored FFM over a crater, which was prepared with a layer of well-compacted crushed stone. Crater preparation is essentially identical to that used with the AM-2 matting system.

6.4.1. A standard folded fiberglass mat weighs about 3,000 pounds and consists of nine fiberglass panels, each 6 feet wide, 30 feet long and about 3/8-inch thick. Elastomer hinges that are approximately 3 inches wide connect the panels. When folded, the mats are 6 feet wide, 30 feet long, and 8 to 10 inches thick.

6.5. Hazards Of RRR:

6.5.1. Lifting AM-2 matting weighing 72 or 144 pounds. Proper lifting techniques must be emphasized during training.

6.5.2. Workers getting fingers or toes pinched or crushed, or suffering lower leg injuries during assembly of AM-2 matting.

6.5.3. Equipment operators, especially augmentees, may not be properly trained or familiar with operating special equipment.

6.6. Specific Requirements:

6.6.1. Equipment operators must be certified on the types of equipment they operate (bulldozer, loader, grader, vibrator compactor, dump truck, sweeper, forklift.)

6.6.2. A supervisor must be appointed to observe RRR operations.

6.6.3. When using AM-2 mat the supervisor will instruct the forklift operator to position mat bundles to minimize carrying distances for work crews. The direction of the bundles should coincide with the direction the mat is being laid so crews don't need to turn each piece of mat around. (The distance from the last row laid to the bundle is calculated so the bundle will be completed by the time the crew gets to that position laying the matting.)

Chapter 7

VEHICLE OPERATIONS, MATERIALS HANDLING EQUIPMENT (MHE) AND AEROSPACE GROUND EQUIPMENT (AGE)

7.1. Vehicle Support. A basic bare base vehicle support package consists of about 60 vehicles, primarily engineering and materials handling types. Vehicles are added to this package as necessary depending on requirements. Additional packages may include M-series vehicles, general-purpose vehicles, tractor-trailer sets, aircraft maintenance and support vehicles and small quantities of RRR equipment. All of these assets are usually shipped into deployment locations either from prepositioned stocks or MAJCOM assets. Vehicle support will likely be a genuine limitation in day-to-day work efforts. Initially, most deployed general-purpose vehicles will not be designated to specific organizations; they must support the entire base populace.

7.2. Built-Up Areas and Local Driving. Mishap experience shows local drivers, especially in some overseas locations, to be very unpredictable, often showing complete disregard of traffic signs, signals, and other forms of traffic control. Local weather conditions can also affect driving. Vehicle and equipment operations, because of the hazards involved, should be closely supervised.

7.2.1. Tent City Sites.

- 7.2.1.1. Limit parking, for fire safety reasons, to designated and authorized vehicle parking areas.
- 7.2.1.2. Vehicles should not be parked between or next to tents or modular living units.
- 7.2.1.3. The Tent City speed limits should be posted no more than 15 kilometers per hour (kph) or 10 miles per hour (mph).
- 7.2.1.4. Perimeter and interior fire lanes will be kept clear.
- 7.2.1.5. Personnel will wear safety belts when operating equipment.

7.2.2. Construction Sites:

- 7.2.2.1. Remind operators that construction equipment may be unstable when operated in sandy or rocky terrain.
- 7.2.2.2. Ensure operators and supervisors check outriggers for stability. This is especially critical in sand or soil where a surface crust exists.
- 7.2.2.3. Ensure rollover protection systems are installed and erect sun umbrellas on slow-speed equipment such as rollers and compactors.
- 7.2.2.4. Ensure ground guides are used at construction sites and in congested areas and tent locations.
- 7.2.2.5. Appoint a site safety supervisor for large earthwork or construction sites.
- 7.2.2.6. Ensure hard-hats are worn at construction sites.
- 7.2.2.7. Control vehicle, pedestrian, and troop access to sites.
- 7.2.2.8. When excavating, ensure excavation walls are reinforced to prevent cave-ins.

- 7.2.2.9. Ensure all electrical equipment is grounded and bonded (if required) when transferring fuel.
- 7.2.2.10. Ensure personal protective equipment (safety belts, goggles, gloves, welding masks, aprons, dust respirators, etc.) is available and used.
- 7.2.2.11. Establish policies and procedures for recovery of equipment in sand, mud, or loose soil.
- 7.2.2.12. Protect electrical wiring, hydraulics, and optics from abrasive effects of blowing sand, snow, rain, etc.

7.3. Vehicle Operations. Vehicle operations and military convoys can present unique hazards for deployed personnel and local populations. Children especially, are invariably curious about military convoys. This curiosity is amplified when military convoy members pass food or trinkets to children. Children can be killed or seriously injured while trying to retrieve handouts from passing convoys. Although military personnel find it difficult to ignore needy children, for their safety, this impulse must be restrained. The potential hazards associated with vehicle operations require supervisors to take the following actions:

- 7.3.1. Provide instruction about local driving customs and practices.
- 7.3.2. Encourage drivers to avoid high civilian-vehicle concentration areas.
- 7.3.3. Ensure all drivers are aware of local weather conditions and frequency, such as rainstorms, low areas, flash flooding, sandstorms, etc. and their effects on roads and traffic.
- 7.3.4. Establish and enforce safe speed limits for various road and environmental conditions.
- 7.3.5. Enforce the requirement to use safety belts (driver and all passengers.)
- 7.3.6. Pair an experienced driver with an inexperienced one to provide supervision and hands-on training.
- 7.3.7. Identify personnel who are not licensed to operate vehicles and ensure they are not tasked to drive.
- 7.3.8. Instruct drivers on conditions that can lead to rollovers—steep slopes, ditches, loose sand, rocky terrain, etc.
- 7.3.9. Ensure equipment is secure to prevent injury from falling equipment or cargo.
- 7.3.10. Remind drivers to slow down when visibility is limited, on rough terrain, and during inclement weather.
- 7.3.11. Caution drivers to avoid steep slopes and narrow trails (leaders must also keep this in mind when planning vehicle moves.)
- 7.3.12. Remind drivers to give special care to tire, track, and suspension checks.
- 7.3.13. Caution drivers to drive at moderate speed and make wide turns at slow speed to maintain vehicle control (especially critical in sand.)
- 7.3.14. To avoid rear-end collisions:
 - 7.3.14.1. Stress safe following distances.

7.3.14.2. Establish warning procedures for vehicle stops and breakdowns to warn approaching vehicles in blackout, sand-storm, and other restricted-visibility conditions.

7.3.15. Advise personnel not to leave vehicles idling inside buildings or enclosed areas for extended periods of time to prevent carbon monoxide build-up.

7.4. Vehicle Operations Checklist:

7.4.1. When chemical defense gear is worn, do drivers train in low risk areas, such as an empty parking lot, until the operator is proficient?

7.4.2. Do operators keep vehicles at slower speeds when wearing chemical gear?

7.4.3. Are drivers and ground guides trained for night operations?

7.4.4. Are drivers in the proper physical and mental condition to operate a vehicle?

7.4.5. Are the operator and senior ranking passenger aware of their responsibility to ensure all passengers are buckled up?

7.4.6. Do security forces periodically monitor vehicle traffic?

7.4.7. Has the pre-operational check (AF Form 1800, **Operator's Inspection Guide and Trouble Report [General Purpose Vehicles]**) been performed to ensure the vehicle's condition?

7.4.8. Do supervisors correct unsafe handling or excessive risk-taking in vehicles by operators?

7.4.9. Is a spotter used when backing a vehicle if the vehicle operator's vision is obstructed?

7.4.10. Are installation speed limits posted and observed by operators?

7.4.11. Is speed reduced in congested areas?

7.4.12. Do vehicles stop when approaching a bus on- and off-loading passengers?

7.4.13. Are vehicles winterized to include checking exhaust for leaks, antifreeze levels, properly functioning heater and defroster?

7.4.14. Are engines turned off in unmanned vehicles?

7.4.15. Does the pre-op check for track vehicles include: fuel connections, electrical wiring, antenna tie down, fire extinguisher, and discharge line connections?

7.4.16. If occupants remain in parked vehicles for prolonged periods of time with the engine running, do they ensure ventilation is adequate?

7.4.17. Do personnel with backpack radios or vehicle field antennas ensure clearance between antennas and overhead lines?

7.4.18. Do operators stop at all crosswalks if pedestrians are present?

7.4.19. Are inside panel lights dimmed at night to reduce glare?

7.4.20. Are directional signals used well in advance?

7.4.21. Are vehicles operated for conditions, not necessarily speed limits?

7.4.22. Do operators know load weight limits for vehicles carrying cargo?

7.4.23. Are all seat belts in the cab of the vehicle filled prior to allowing passengers in the truck bed?

- 7.4.24. Do passengers in the back of vehicles sit on the bed, not on the wheel wells or tail gate—and do not stand up?
- 7.4.25. Do riders sit as far forward (toward the cab) as practical?
- 7.4.26. Is the tailgate closed, with no one sitting on it or leaning against it?
- 7.4.27. Are passengers in the back of small pickups (smaller than those manufactured in the US) limited to two and ride with their backs up against the cab?
- 7.4.28. Are drivers briefed on terrain changes if traveling off the roadway?
- 7.4.29. Are roadway condition codes, if used, observed? (GREEN = good, AMBER = exercise caution, RED = only emergency vehicles, and BLACK = roads are impassable.)
- 7.4.30. If carrying cargo, is it secured to prevent shifting or moving?
- 7.4.31. Are proper following distances enforced, especially in convoy movements?
- 7.4.32. Are emergency procedures established in the event of a vehicle break down?
- 7.4.33. Do spotters use hand signals when guiding so the driver knows who is giving the signals and what the signals mean?
- 7.4.34. Do spotters keep out of the vehicle's path (or stay at least 10 yards away) when the vehicle is moving?
- 7.4.35. Do spotters keep in sight of the driver? (Never turn your back on a moving vehicle.)
- 7.4.36. Does the operator stop the vehicle if the spotter cannot be seen or if the signal is not clear?
- 7.4.37. Is there a pre-plan to help prevent night ground guide mishaps?
- 7.4.38. Are vehicle operators adequately rested?
- 7.4.39. Are headlights used during rain and fog and from dusk to dawn?
- 7.4.40. Are passengers seated while the vehicle is in motion?
- 7.4.41. Is there an ice scraper in the vehicle?
- 7.4.42. Do operators ensure deicing fluid is not sprayed, due to its toxicity, with the heater or defroster operating?
- 7.4.43. Are special purpose vehicle operators thoroughly trained and certified?
- 7.4.44. Are riders prohibited from sitting on unsecured objects or equipment in the truck bed?
- 7.4.45. Are riders prohibited from sharing the truck bed with any top-heavy objects or equipment that could shift and injure them?
- 7.4.46. If operators wear night vision goggles, are they thoroughly trained?

7.5. Material Handling Equipment (MHE) and Aerospace Ground Equipment (AGE). Consider the following:

- 7.5.1. Are operators trained before using MHE?
- 7.5.2. Are storage areas kept neat and orderly?

- 7.5.3. Are forklift operators properly trained?
- 7.5.4. Is cargo the proper height so that the operator's vision is not obstructed?
- 7.5.5. Does the operator ensure the load is secured with proper tie-down straps or chains?
 - 7.5.5.1. Personnel will not position themselves on a load in an attempt to stabilize it.
- 7.5.6. Do workers check the weight and size of items to be carried and do they get assistance for bulky or awkward items?
- 7.5.7. Do workers eliminate or cover sharp edges on objects prior to movement?
- 7.5.8. Do supervisors monitor safe lifting techniques?
- 7.5.9. When lifting, do workers: keep their back straight, plant feet slightly apart, one behind the other, knees bent, tuck in chin, and center body over their feet?
- 7.5.10. Do workers watch for slippery surfaces and tripping hazards? Do they keep walkways clear?
- 7.5.11. Are well-maintained ladders used?
- 7.5.12. Do workers wear gloves and safety toed shoes?
- 7.5.13. Are batteries on MHE charged only in designated, approved areas?
- 7.5.14. Is lighting adequate and approved in storage areas?
- 7.5.15. Do supervisors ensure MHE speed limits and load limits are not exceeded?
- 7.5.16. When MHE is left unattended are controls shut off; brake set; and forks, blade, or scoop lowered?
- 7.5.17. Do operators ensure MHE is not running during refuel?
- 7.5.18. Are all pallets arriving with three point dunnage, 4 by 4 inches, with a minimum length of 88 inches if dunnage is not available in the marshalling area?
- 7.5.19. Are pallets and cargo free of excessive grease and oil?
- 7.5.20. Is tie-down equipment functional?
- 7.5.21. Is hazardous cargo palletized, readily visible, and easily accessible?
- 7.5.22. Are the required hazardous labels affixed to the hazardous cargo and visible?
- 7.5.23. Is dunnage adequately secured to the cargo for air shipment?
- 7.5.24. Are there sufficient cargo loading teams available?
- 7.5.25. Is cargo transported to the aircraft in a safe and timely manner?
- 7.5.26. Are diesel engine vehicles parked and loaded in neutral?
- 7.5.27. Is a Declaration of Dangerous Goods prepared and attached to all hazardous cargo shipments?
- 7.5.28. Have personnel received training on hazardous cargo identification and marking?
- 7.5.29. Is compatibility maintained for hazardous cargo loaded on the same pallet, according to Air Force Joint Manual (AFJMAN) 24-204, *Preparing Hazardous Materials for Military Air Shipments*?

- 7.5.30. Does the load team crew chief use an explosive checklist and is it completed prior to loading explosives?
- 7.5.31. Is the aircraft on an authorized hazardous/explosives cargo parking spot and is the plane properly placarded?
- 7.5.32. Is the fire department notified of hazardous cargo loading operations, i.e., parking spot, hazard/class and division, and net explosive weight (NEW)?
- 7.5.33. Are batteries secured to prevent movement?
- 7.5.34. Are battery cables disconnected, terminal ends taped, and cables secured to prevent movement?
- 7.5.35. Are parking brakes set on AGE?
- 7.5.36. Are checks made for hydraulic leaks, radiator leaks, or hose leaks?
- 7.5.37. Are door panels and loose items secured by strapping or taping?
- 7.5.38. Are equipment and vehicles manned when operating?
- 7.5.39. Are vehicles and trailers chocked while in AGE subpools?
- 7.5.40. Are grounding straps on tow bars secured to prevent damage and not dragging behind the AGE vehicle?
- 7.5.41. Is equipment being towed visible during the hours of darkness by some means of reflective markings?
- 7.5.42. Is all unused equipment stored in a designated area and not left in vehicle thruways?
- 7.5.43. Are gas caps checked to ensure against pressure overflow?
- 7.5.44. Are "gravity feed" loader operations prohibited?
- 7.5.45. Do supervisors allow only single servicing operations on an aircraft when explosives are being loaded?

Chapter 8

FLIGHT LINE OPERATIONS

8.1. General Flight Line. During ground operations, various hazards are encountered due to the nature of the work, the equipment and the tools involved. Deployment locations and harsh environments can compound these hazards. Most hazardous situations can be avoided by following established procedures. Reference AFOSH Standard 91-100, *Aircraft Flight Line – Ground Operation and Activities*, for additional information. However, the following checklist is provided to address some of the minimum safety requirements associated with flightline operations.

- 8.1.1. Are wing walkers used when aircraft are taxied within 25 feet of an obstacle?
- 8.1.2. Are aircraft towed and not taxied if within 10 feet of an obstruction (unless authorized)?
- 8.1.3. Are aircraft ejection seat safety pins installed at all times while aircraft are on the ground unless removed for system maintenance?
- 8.1.4. Are unconnected air, oil, fuel, hydraulic lines, and electrical connectors capped or covered to prevent contamination?
- 8.1.5. Are bunny suits used for intake inspections? Are they worn properly?
- 8.1.6. Are finger rings removed prior to personnel working in, on, or around aircraft? Also, watches and bracelets will not be worn when working around electrical circuits.
- 8.1.7. Are engine intake covers used as required?
- 8.1.8. Do all safety pins, locks, covers, etc., have “Remove Before Flight” streamers?
- 8.1.9. Is an In-Process Inspection (IPI) program in effect? Are IPIs listed in either technical data or in an Operating Instruction? Are maintenance personnel familiar with them?
- 8.1.10. Are management procedures in effect to ensure Joint Oil Analysis Program (JOAP) samples are forwarded to the JOAP laboratory on a timely basis?
- 8.1.11. Is appropriate lighting available and used for night maintenance operations?
- 8.1.12. Is an effective hazard reporting program established throughout the maintenance complex? Are maintenance personnel familiar with reporting procedures? Do supervisors encourage submission of hazard reports on valid hazards?
- 8.1.13. Are supervisors familiar with their responsibilities and roles in the unit safety program?
- 8.1.14. Are engine personnel qualified and certified IAW existing directives?
- 8.1.15. Are safety precautions taken around engine intakes and exhausts during engine-run operations?
- 8.1.16. Are engine-run screens/anti-personnel screens (if applicable) utilized as required? Are they inspected according to existing directives?
- 8.1.17. Is required protective gear (aprons, goggles, face shields, gloves, etc.) available and used by servicing crews?

- 8.1.18. Are aircraft grounded IAW TO 00-25-172 and aircraft specific tech data when required; i.e., during munitions loading or unloading operations?
- 8.1.19. Are metallic tanks (Drop, External, Ferry, Benson, Weapons Bay) grounded during periods of in-tank inspection and maintenance?
- 8.1.20. Are fuel bowsers bonded during draining or filling operations? Are they serviced regularly to prevent overflow or leakage?
- 8.1.21. Are external fuel tank drain procedures performed IAW existing directives? Are the stand-pipes covered?
- 8.1.22. When tanks are delivered to the Fuel Shop for storage, are AFTO Forms 350, **Repairable Item Processing Tag**, properly filled out and Fuel Shop personnel notified?
- 8.1.23. Is flightline smoking restricted to designated locations?
- 8.1.24. Do personnel stand on maintenance stand rails to perform work (prohibited)?
- 8.1.25. Does each maintenance stand have at least two functional brakes?
- 8.1.26. Are maintenance stand brakes set at all times when the stand is not being used?
- 8.1.27. Are stands lowered after use? Are rails properly reinstalled?
- 8.1.28. Do maintenance stands have inspection forms?
- 8.1.29. Are unserviceable stands restricted from use?
- 8.1.30. Are maintenance stands inspected daily (if required) and properly stored and secured to prevent collision with aircraft, vehicles, etc.?
- 8.1.31. Are personnel prohibited from riding on mobile stands while they are being moved unless stands are specifically designed for such a purpose?
- 8.1.32. Are suitable fire extinguishers appropriately placed as required for maintaining or servicing aircraft?
- 8.1.33. Is there written guidance covering local safety precautions for hangaring of aircraft? Are personnel familiar with this guidance if it's required?
- 8.1.34. Is parking vehicles within 10 feet of aircraft prohibited? Exceptions: load vehicles, passenger service, fleet service, etc. Are spotters used when vehicles move within the "Circle of Safety?"
- 8.1.35. Is AGE equipment braked or chocked, which ever is appropriate?
- 8.1.36. Do personnel wear proper hearing protection when around operating aircraft and equipment, or when in hazardous noise areas?
- 8.1.37. Do nonessential personnel remain outside the area during refueling, servicing, and loading operations?
- 8.1.38. During concurrent servicing operations does the Chief Servicing Supervisor (CSS) coordinate with maintenance, loading, and refueling?
- 8.1.39. Are power unit electrical power cables sufficient length to permit parking the unit at least 50 feet away, preferably upwind, from pressurized fuel carrying service components and at least 25 feet from aircraft fuel vent outlets?

- 8.1.40. Is grounding/bonding accomplished during refueling?
- 8.1.41. Does aircraft parking allow for direct access of emergency vehicles?
- 8.1.42. Are self-closing containers available for oily rags?
- 8.1.43. Are fire lanes within and outside of buildings kept clear?
- 8.1.44. Are the following requirements met:
 - 8.1.44.1. Are taxi lines and nose wheel stop marks clearly visible? Coordination with the airfield manager or CE may be necessary to ensure marks are adequate for the aircraft deployed.
 - 8.1.44.2. Are aircraft parked with nose wheels on nose wheel-stop marks?
 - 8.1.44.3. Are aircraft aligned with taxi parking lines?
 - 8.1.44.4. Are individuals prohibited from resting or laying down on unlighted ramps?
 - 8.1.44.5. Personnel on the flight line must wear reflective material (reflective belt) on their outer garment during hours of darkness (when appropriate for the operation.). Aircrew members are exempt if they are present for crew duties and within 50 feet of the aircraft. They may substitute a lighted flashlight for the reflective belt.
 - 8.1.44.6. The ramp must remain clear of all foreign object debris (FOD) that could cause damage to engines, tires, or other equipment. Are FOD walks conducted regularly?
 - 8.1.44.7. Smoking is not permitted within 50 feet of an aircraft. Smoking is not permitted within 100 feet of aircraft during hazardous ground operations (refueling, LOX servicing, explosives handling, or hazardous cargo handling). Appropriate signs will be posted when required. Use of butane lighters on or around aircraft is prohibited. Only personnel involved in the hazardous ground operation should be present (within 100 feet of the perimeter of the working area).
 - 8.1.44.8. Is the runway, taxiway, parking ramp stressed for weight of necessary aircraft?
 - 8.1.44.9. Is the condition of all airfield pavement FOD-free?
 - 8.1.44.10. Are sweeper trucks available in adequate numbers? (Desert, rocky environments may require multiple sweepers.)
 - 8.1.44.11. Does the airfield have an operable cable or barrier system?
 - 8.1.44.12. Are there published, authorized instrument approach plates available?
 - 8.1.44.13. All personnel will avoid exhaust areas.
 - 8.1.44.14. Serviceable fire bottles, IAW TO 00-25-172, will be present on the ramp; the number depending on the aircraft. Aerospace ground equipment (AGE) operated in the area of an aircraft may share the aircraft fire bottle. If the AGE is operated at a remote location, it will have its own serviceable fire bottle present.
 - 8.1.44.15. All aircraft engine starts require a ground monitor.
 - 8.1.44.16. Workers will ensure equipment (tiedown chains, chocks, wrenches, etc.) is not thrown about the aircraft or placed where it might be forgotten and become a foreign object.
 - 8.1.44.17. No equipment will be refueled or otherwise serviced within 50 feet of an aircraft.

8.1.45. Are caution signs directing attention to hazards present in jet runup areas posted at entrances, gates, and other approaches to jet runup areas?

8.2. Aircraft Parking Plan:

8.2.1. Check the available ramp space at the deployed location. Contact the Wing Plans Officer and the Deploying Maintenance Supervisor to see what kind of room will be available for the aircraft.

8.2.1.1. If the allocated space will not permit required separation for either taxiing or parking the number and type of aircraft deploying, try to arrange for additional space to obtain the required separation. If additional space cannot be obtained, identify a point at which aircrews can safely taxi to park the aircraft so maintenance can tow the aircraft to final parking.

8.2.1.2. Ensure actual separation distances are included on the parking plan. In addition, ensure all maintenance personnel and aircrews are briefed on any less than usual distances for taxiing or parking and any special procedures. Don't forget wing walkers are required for obstacle clearances between 10 and 25 feet.

8.2.2. After arriving at the deployed location ensure the following:

8.2.2.1. Is there a driving plan (arrows for driving direction)?

8.2.2.2. Are the rows lettered and numbered?

8.2.2.3. Are the restricted area Entry Control Points placed for ease of access for emergency vehicles?

8.2.2.4. Is there proper distance between aircraft? Example: A C-130 is 133 feet wide and 100 feet long. To allow 25 feet between wing tips (side by side), place nose wheel spots 158 feet apart. To get the minimum required 30-foot wing-tip taxi clearance between rows of parked aircraft (nose to tail), place nose wheel spots 293 feet apart. **NOTE:** In some cases explosive siting may dictate greater distance requirements than those mentioned here. Distances less than those listed should be clearly identified on the parking plan and briefed to all personnel.

8.2.2.5. Are taxi lines clearly and properly identified?

8.2.2.6. Is parking plan coordinated with LG, DO, SF and other interested agencies prior to reproduction of the plan?

8.2.2.7. After reproduction, are the restricted areas outlined in red?

8.2.2.8. Are copies of the parking plan distributed to flight line vehicle operators and mission support, operations, security forces, fire department, and medical and ambulance personnel?

8.2.2.9. If weapons or explosives are on board, are aircraft parked in explosives-sited areas appropriate for the type and quantity of weapons or explosives involved?

8.2.3. Ensure personnel understand that safety officials can be contacted for the following:

8.2.3.1. Injury or property damage information and trends.

8.2.3.2. Local hazards and restrictions.

8.2.3.3. Local flight line smoking restrictions.

8.2.3.4. Fuel spills.

8.2.3.5. Location and capability of nearest hospital.

8.2.3.6. Local collision avoidance procedures.

8.2.3.7. Safety publications location.

8.2.3.8. Unusual weather patterns.

8.2.4. Ensure the following:

8.2.4.1. Has a hot brake area been established?

8.2.4.2. What are the engine-run restrictions (time of day, location, RPM/throttle settings, etc.)?

8.2.4.3. Has a hot gun area been established?

8.2.4.4. Have signs been placed in conspicuous places with instructions how to contact the safety representative to report hazards and mishaps?

8.2.4.5. Are Hazard Reports (AF Form 457) readily available?

8.2.4.6. Does the safety representative maintain a log with all safety discrepancies and corrective actions?

8.2.4.7. Do all pertinent people and offices know how to reach the safety professional, or commander's representative on station, by telephone and radio?

8.3. Foreign Object Damage (FOD) Incident:

8.3.1. Have all details been logged?

8.3.2. Do you work with the deployed maintenance officer in reporting the mishap?

8.3.3. Have you notified both host and home unit safety officials?

8.3.4. Have the required messages been completed?

8.4. Maintenance Operations Center (MOC)/Maintenance Aircraft Coordination Center(MACC):

8.4.1. Does the MOC/MACC ensure wing safety officials and the command post are notified of mishaps involving aircraft, FOD, or injuries during aircraft maintenance?

8.4.2. Does the MOC/MACC maintain checksheets for use in the event of an aircraft crash, flight line fire, or other unusual circumstances?

8.5. Forms Documentation:

8.5.1. Are all operational leak checks documented on the aircraft forms?

8.5.2. Are exceptional releases signed off by the maintenance officer or a designated nine-level representative?

8.5.3. Are Red X items properly cleared by supervisory personnel?

8.5.4. Is adequate corrective action taken on write-ups?

8.5.5. Are pilot write-ups given the correct symbol?

8.5.6. Do the AFTO 781 forms reflect the current status of the aircraft?

8.5.7. Are all AFTO Forms 781A, **Maintenance Discrepancy and Work Document**, accounted for at the aircraft and at plans and scheduling? (There should be 781 forms covering the previous 3 months and the current month should be readily available.)

8.6. Aircrew Debriefing:

- 8.6.1. Is proper documentation being filled out by debrief?
- 8.6.2. Do knowledgeable personnel debrief complex write-ups?
- 8.6.3. Are all required regulations, technical orders, and operating instructions available?
- 8.6.4. Do pilot write-ups contain enough information so maintainers can adequately troubleshoot discrepancies?
- 8.6.5. Do debriefers track write-ups and classify them properly as to “repeat” or “recur”?
- 8.6.6. Are repeat and recurring write-ups identified in the AFTO Form 781A discrepancy block?
- 8.6.7. Are debriefers familiar with aircraft impoundment procedures?
- 8.6.8. In case of a ground abort, do aircrews make an entry on the AFTO Form 781A before proceeding on to the next aircraft?
- 8.6.9. Is the debrief section adequately manned?
- 8.6.10. Are fault reporting manuals and codes used?
- 8.6.11. Are all necessary crew members available (if applicable) at the debriefing to ensure information concerning aircraft discrepancies is recorded?

8.7. Aircraft Launch And Recovery:

- 8.7.1. Are maintenance personnel qualified to perform start, launch, and recovery procedures?
- 8.7.2. Is a serviceable fire bottle available?
- 8.7.3. Is current, applicable tech data on hand?
- 8.7.4. Are consolidated tool kit (CTK) inspections performed as required?
- 8.7.5. Do personnel involved with start and launch have ear protection (usually ear plugs and muffs?)
- 8.7.6. Is an area FOD inspection performed prior to engine start?
- 8.7.7. Is a communication cord in use? If hand signals are used, are they correct?
- 8.7.8. Are flight control checks performed before taxi?
- 8.7.9. Are all panels and doors secured prior to taxi?
- 8.7.10. Are chocks installed until the proper signal is given to remove them?
- 8.7.11. On recovery, is communication established between ground crew and aircrew before shutting down engines?
- 8.7.12. Are safety pins installed as required?

8.8. Loading Operations:

- 8.8.1. Do aerial port personnel and aircrew loadmasters coordinate with one another?
- 8.8.2. Are aircraft loading struts positioned prior to loading?
- 8.8.3. Do workers wear gloves during handling?
- 8.8.4. Are personnel prohibited from walking behind cargo being winched or driven up ramps?
- 8.8.5. Are personnel prohibited from stepping across winch cables under load?
- 8.8.6. Do winching operations cease during refueling operations?

8.9. Jacking Operations:

- 8.9.1. Is the area surveyed level for jacking operations?
- 8.9.2. Are appropriate warning signs (“Aircraft on Jacks”) posted when aircraft jacking operations are conducted?
- 8.9.3. Is aircraft jacking performed by qualified personnel?
- 8.9.4. Are aircraft NOT left on jacks overnight except when absolutely necessary?
- 8.9.5. Are all munitions downloaded prior to jacking?
- 8.9.6. Are all jacks correctly seated?
- 8.9.7. Are all jack ram locknuts down?
- 8.9.8. Are jack ram extension limits not exceeded?
- 8.9.9. Is the nose wheel centered during nose wheel jacking?
- 8.9.10. Is appropriate technical data available?
- 8.9.11. Is the aircraft grounded (if required?)
- 8.9.12. Are fire bottles available and properly positioned?
- 8.9.13. When jacking outside, is the maximum wind velocity of 15 mph observed?
- 8.9.14. Are work stands and other equipment not required for jacking or essential maintenance removed from under the aircraft?
- 8.9.15. Are jacks inspected before use to verify lifting capacity, proper functioning of safety locks, condition of pins, and serviceability?
- 8.9.16. Is aircraft weight checked to establish center of gravity before jacking?
- 8.9.17. Are chocks removed prior to jacking?
- 8.9.18. Are locking pins or nuts set immediately after jacking is complete?
- 8.9.19. Is there a space of 25 feet between the aircraft and the hydraulic pumping unit during hanger-dock jacking operations?
- 8.9.20. When performing landing gear retractions or extensions, are directions given verbally or by using an interphone system only after visual assurance the wheel well and swing area are clear?

- 8.9.21. Are personnel prevented from passing under, climbing, or walking on any portion of an aircraft which is entirely supported by jacks (except as operationally necessary to perform maintenance?)
- 8.9.22. When an aircraft is on jacks and the landing gear is clear of the floor, are engines or other major components prevented from being changed unless allowed by technical data?
- 8.9.23. Is the underneath of the aircraft cleared of stands, equipment, etc. prior to releasing jack pressure and lowering aircraft?
- 8.9.24. Is the work area clear of all personnel except those required to operate jacks and free struts?
- 8.9.25. Are personnel assigned to monitor each jacking point and the center of balance?

8.10. Towing:

- 8.10.1. Does the tow team chief or supervisor have and use appropriate tech data?
- 8.10.2. Does the team chief walk in full view of the tow vehicle operator and the aircraft? Do wing walkers actually walk at the wingtips as required?
- 8.10.3. Is the aircraft free of munitions?
- 8.10.4. Do team members have luminous wands for nighttime operations?
- 8.10.5. Are proper chocks in place before the towing vehicle is disconnected?
- 8.10.6. Are necessary doors and panels closed and secured or pins installed before starting the tow?
- 8.10.7. Are brake systems fully charged before towing?
- 8.10.8. Are the tow vehicle and tow bar inspected prior to tow?
- 8.10.9. Are struts and tires checked for proper inflation prior to towing?
- 8.10.10. Are tow speed limits observed?
- 8.10.11. Does the tow team have the required number of qualified personnel?
- 8.10.12. Does the person in the cockpit monitor ground control frequency?
- 8.10.13. Is the nose walker (supervisor) in contact with the person in the cockpit by interphone (when directed by aircraft technical data?)
- 8.10.14. Are personnel prohibited from entering or exiting the aircraft or tow vehicle while in motion?
- 8.10.15. Is steerable landing gear set in the tow position (if applicable) before moving aircraft?
- 8.10.16. Are entrance doors closed, ladders retracted or removed, and landing gear down locks installed during tow operations?
- 8.10.17. Does the tow vehicle operator stop the vehicle if he or she loses sight or communications with the tow supervisor?
- 8.10.18. Are personnel prohibited from walking between the nose wheel of the aircraft and tow vehicle?
- 8.10.19. Is tower approval granted before towing an aircraft on or across runways and taxiways?

- 8.10.20. Are all equipment, workstands, loose aircraft parts, and other materials removed from the vicinity of the aircraft prior to towing?
- 8.10.21. Are all ramps clear of snow and ice, 100 feet in front of dock doors and far enough to each side to accommodate all landing gear wheels?
- 8.10.22. Are sandbags and chocks used when towing or parking aircraft when ice, snow, or frost is present?
- 8.10.23. When securing pintle assemblies and towing connections is a pintle-hook safety pin used to ensure connections stay locked?

8.11. Mooring:

- 8.11.1. Are all required protective plugs and covers installed on parked aircraft?
- 8.11.2. Are all aircraft tied down during periods of high winds, and aircraft control surfaces secured? (Check for security of nose tie downs to include the nose docks.)
- 8.11.3. Are mooring points on the ground as close as possible to being directly under the respective mooring points of the aircraft? (Just enough slack should be allowed to prevent excessive stress on the wings and tie down rings.)

8.12. Refuel And Defuel:

- 8.12.1. Are all personnel familiar with the duties and responsibilities of their position?
- 8.12.2. Are all unnecessary personnel kept out of the fueling area?
- 8.12.3. Does the refuel supervisor have and use appropriate technical data?
- 8.12.4. Does the refuel supervisor ensure all possible sources of ignition are removed from the restricted area?
- 8.12.5. Are aircraft chocked?
- 8.12.6. Is the aircraft safe for maintenance?
- 8.12.7. Is the required number of personnel for the refuel on hand?
- 8.12.8. Are ground power units positioned at least 50 feet from fueling points and vents?
- 8.12.9. Are spotters used when backing servicing vehicles into position?
- 8.12.10. Are the aircraft and servicing vehicle correctly bonded?
- 8.12.11. Is refueling accomplished 50 feet away from operating aircraft?
- 8.12.12. Is the refuel nozzle visually and physically checked for correct engagement?
- 8.12.13. Are all appropriate tank vents checked for airflow when refueling?
- 8.12.14. Is the fire department notified of major fuel spills?
- 8.12.15. Are fire bottles serviceable and positioned IAW TO 00-25-172?
- 8.12.16. Are new servicing operations prohibited from starting during an in-flight emergency (IFE) without approval by the fire chief?

- 8.12.17. Are fuel servicing operations suspended when a “lightning within 5-nm miles” advisory has been issued (refer to paragraph 12.8.)?
- 8.12.18. Do all personnel involved in the refueling process frequently ground themselves to dissipate static potential?
- 8.12.19. Is the refuel and defuel nozzle disconnected before grounding or bonding wires are removed?
- 8.12.20. Are over-the-wing hose nozzles and connectors equipped with suitable bonding cables and cannon plugs?
- 8.12.21. During over-the-wing refueling, is the nozzle bonded to the aircraft prior to removing the fuel cap, and does it remain in place until the tank cap is replaced?
- 8.12.22. Have measures been taken to ensure personnel never lock or block fuel hose nozzles in an OPEN position?
- 8.12.23. During multiple-unit servicing, does the refueling operator continuously monitor fuel-flow meters to detect any indications of reverse fuel flow?
- 8.12.24. If during multiple-unit servicing reverse flow occurs, are all operations stopped and not restarted until the causes of reverse flow are determined and corrected?
- 8.12.25. If refueling and defueling from hydrant systems, is a qualified operator stationed in the hydrant pump house of Types I and II systems during the entire operation?
- 8.12.26. Does the operator ensure there is no pressure at the outlet prior to hooking up the moosehead on Type I and II systems?
- 8.12.27. Is the hose cart bonded to the hydrant outlet?
- 8.12.28. Does the hose cart operator inspect the remote control cables to ensure they are hermetically sealed and serviceable?
- 8.12.29. Are hoses pressurized and inspected for leaks prior to the first servicing of the day?
- 8.12.30. Do hose cart operators ensure hoses are wrapped to preclude from rubbing or dragging the hoses?
- 8.12.31. Do hose cart operators ensure all personnel involved in servicing operations are aware of the location and use of hydrant emergency shutoff switches?
- 8.12.32. Has verification been made of the proper fuel?
- 8.12.33. Are proper clothing restrictions observed for aircraft servicing operations?
- 8.12.34. Is the refueling hose stretched out and free of kinks and loops prior to commencing refueling operations?
- 8.12.35. When radios, laptop computers, or cellular telephones are used within the refueling area do personnel follow procedures established in TO 00-25-172 paragraph 6-5. a. (3)?
- 8.12.36. Are fuel bladders located as far as practical from other facilities? (Sandbag these if possible.)
- 8.12.37. Do fuel bladders have earthen berms to contain any spillage or leaks? (Earthen berms should be capable of containing 125 percent of tank capacity.)

8.12.38. Are “No Smoking” signs posted around fuel storage areas?

8.12.39. Are fire rescue crews and vehicles on standby (if required) during operations referenced in TO 00-25-172?

8.13. Liquid Oxygen (LOX) Servicing:

8.13.1. Is oxygen serviced only by qualified personnel?

8.13.2. Are proper servicing procedures adhered to?

8.13.3. Are all spark-producing devices eliminated from the 50-foot restricted area?

8.13.4. Is all servicing documented on LOX cart forms?

8.13.5. Do personnel ensure clothing, PPE, equipment, and tools are free of oil or grease contamination when working with or around LOX?

8.13.6. Do servicing personnel wear required PPE to include:

8.13.6.1. Face Shield.

8.13.6.2. Gloves.

8.13.6.3. Apron.

8.13.6.4. Head Covering.

8.13.6.5. White 100% cotton coveralls.

NOTE: In an actual combat or high threat environment the on-scene commander will conduct a risk assessment to determine when the chemical warfare defense ensemble will be worn during LOX servicing. Assessment will be based on the local risk or situation.

8.13.6.6. Shoes which fit closely around the top with conductive rubber soles and heels.

NOTE: Personnel will wear hats that completely cover the head when they are servicing LOX with connectors above the eye level. Personnel engaged in LOX operations will have a clean change of clothes available at cryogenic storage areas in case their clothing is contaminated.

8.13.7. Are flame- or spark-producing devices prohibited within 50 feet of oxygen servicing operations?

8.13.8. Are clean drip pans placed under the overflow vent outlet and the LOX cart?

8.14. Technical Order (TO) Compliance:

8.14.1. Is applicable tech data available and used during maintenance?

8.14.2. Is applicable tech data available and used during required inspections?

8.14.3. Is emphasis placed on the use of technical data during all operations?

8.14.4. Are centralized TO libraries adequate?

8.15. Integrated Combat Turn (ICT):

8.15.1. Are the fire protection requirements outlined in TO 00-25-172 followed?

- 8.15.2. Do all personnel remain clear of forward-firing ordnance? (If electrical power is applied, personnel will not stand in front or back of loaded missiles, rockets, flare dispensers, or guns during electrical mating or after the munitions have been electrically connected.)
- 8.15.3. Is the aircraft grounded IAW the applicable tech data?
- 8.15.4. Are AGE or weapons trailers parked in locations so that they don't present a hazard to taxiing aircraft? **NOTE:** Explosives-loaded weapons trailers must be parked in sited locations only.
- 8.15.5. Do personnel use ear protection (usually ear plugs and muffs?)
- 8.15.6. Do personnel remove finger rings?
- 8.15.7. Is a combat turn director used as required?
- 8.15.8. Is an area turn supervisor used as required?
- 8.15.9. Is a safety briefing conducted prior to ICT start?
- 8.15.10. Is applicable tech data available and used?
- 8.15.11. Do supervisors monitor the work?
- 8.15.12. Are aircraft inspected for leaks, hot brakes, and battle damage prior to entering the ICT area?
- 8.15.13. Is the aircraft positioned in the direction that will present the minimum hazard to personnel and equipment in the event of an accidental firing of rockets, missiles, or gun?
- 8.15.14. Is the ICT area kept clear of unnecessary tools and equipment?
- 8.15.15. If the aircraft engine(s) is (are) running, have personnel removed hats and secured any loose items? Do all personnel use extreme caution when working near engine intake areas?
- 8.15.16. Do aircrew members keep both hands in full view or is verbal communication established prior to and during arming and dearming operations, indicating hands are clear of all switches and controls?
- 8.15.17. If electrical power is applied, are all applicable stations electrically and mechanically safed or impulse cartridges removed?
- 8.15.18. Prior to handling electrically primed munitions, do personnel ground themselves to dissipate buildup of static electricity?
- 8.15.19. Are only intrinsically-safe radios used within 10 feet of a fuel spill, an aircraft fuel vent outlet or open port outlet (when being fueled), and a truck receiving fuel, IAW TO 00-25-172?
- 8.15.20. Prior to the ICT start, is the support equipment checked for serviceability and the area checked to ensure it is clear of foreign objects?
- 8.15.21. Are three-person teams used to carry the Air Interceptor Missiles (AIM-9)?
- 8.15.22. Are vehicles prohibited from parking or stopping in front of aircraft loaded with forward firing ordnance?

8.16. Hot Pit Refueling:

- 8.16.1. Are personnel who operate equipment qualified and certified?
- 8.16.2. Has the hot pit area been certified for hot refueling by the MAJCOM?

- 8.16.3. Are personnel and equipment positioned to avoid forward firing ordnance?
- 8.16.4. Are aircraft positioned to avoid existing winds blowing potential vapor or spray from the single point adapter toward the intake of an operating engine? Are aircraft positioned so jet exhaust is not directed at another aircraft on the hot refueling pad?
- 8.16.5. Are aircraft checked for hot brakes prior to entering the hot refueling pad?
- 8.16.6. Is an adequate precheck accomplished (appropriate engine shutdown, if applicable, armament pins installed, and aircraft checked for hydraulic or fuel leaks)?
- 8.16.7. Do personnel stay clear of aircraft danger areas?
- 8.16.8. Is the supervisor positioned to have an unobstructed view of the pilot and the entire refueling operation?
- 8.16.9. Is the nozzle checked visually and physically for proper engagement?
- 8.16.10. Are appropriate tank vents checked for correct airflow?
- 8.16.11. Are emergency procedures outlined in checklists?
- 8.16.12. Are the required number of personnel available?
- 8.16.13. Are two fire extinguishers available IAW TO 00-25-172?
- 8.16.14. Is a modular skid-mounted or installed fire suppression equipment employing aqueous film forming foam (AFFF) available? If not, is fire protection provided by standby fire fighting vehicles and crews?
- 8.16.15. Is appropriate fire protection support on site before hot refuel operations start?
- 8.16.16. Did the hot pad supervisor provide a safety briefing to team members on their assignment and responsibilities concerning safety, aircraft configuration, and ground conditions?
- 8.16.17. Does the hot refueling supervisor ensure the integrity of the fuel servicing safety zone (FSSZ) is not compromised?
- 8.16.18. Is a wind sock available to monitor wind direction?
- 8.16.19. Is the proper bonding sequence accomplished before refuel operations?
- 8.16.20. Has the refuel equipment operator assumed a position at the refueling equipment to observe pressure gauges and immediately identify and respond to problems? Is the aircraft refueling supervisor positioned to observe the hot pad operation and to identify and respond to problems?
- 8.16.21. Does the hot refueling supervisor physically ensure the fuel servicing equipment outlet nozzle is securely locked to the aircraft and the deadman control valve is hand held?
- 8.16.22. Does the hot refueling supervisor maintain intercom contact with the pilot and hot refueling crew personnel to ensure the safety of the operation?

8.17. Flight Line Explosive Operations:

- 8.17.1. Are explosives-loaded aircraft parked in an approved explosives parking area and are explosives limits observed?

- 8.17.2. Are aircraft loaded with forward firing ordnance oriented to provide minimum hazard to personnel, facilities, and off-base inhabited areas in the event of an accidental firing?
- 8.17.3. Are adequate controls in effect to prevent flame producing devices from being taken within 50 feet of explosives-loaded aircraft?
- 8.17.4. Are aircraft parking locations provided with suitable grounding points, and are explosives-loaded aircraft properly grounded prior to starting maintenance?
- 8.17.5. Are mechanical devices installed in order to “safe” explosives?
- 8.17.6. Is the aircraft properly chocked?
- 8.17.7. Are all pylon, bomb rack, multiple ejector rack (MER) triple ejector rack (TER), and launcher pins installed?
- 8.17.8. Is fire-fighting equipment available and serviceable?
- 8.17.9. Did the team chief conduct a safety briefing prior to the loading operation?
- 8.17.10. Are torque wrenches and multimeter calibrations up-to-date?
- 8.17.11. Is proper tech data available and used?
- 8.17.12. Are maintenance operations prohibited during loading?
- 8.17.13. Is the aircraft armament status recorded on the appropriate AFTO Forms?
- 8.17.14. Are all fire control selector switches set in the SAFE and OFF position?
- 8.17.15. Are the armament circuit breakers pulled?
- 8.17.16. Is the armament master switch set to the SAFE position?
- 8.17.17. Are bomb release and jettison switches set in the SAFE or OFF position?
- 8.17.18. Have all guns been cleared manually?
- 8.17.19. Are personnel who work in a hazardous location or who handle or install unpackaged electrically initiated explosive devices and ammunition prohibited from wearing clothing made of materials that have high-static generating characteristics?
- 8.17.20. Do all personnel properly ground themselves IAW applicable technical data?
- 8.17.21. Are personnel prohibited from standing directly in front of or behind forward firing ordnance during loading and downloading?
- 8.17.22. Are required ammunition and explosives devices removed before moving aircraft into a maintenance hangar, per TO 11A-1-33, *Maintenance and Handling of Explosive Loaded Aircraft*?
- 8.17.23. Has the Fire Department been notified of explosives operations on the flight line and are fire symbols posted?

8.18. End Of Runway (EOR) Operations:

- 8.18.1. Are EOR teams equipped with the required items? (Ear protection, communication cords, wands, checklists, and supervisor vest.)
- 8.18.2. Are arm and dearm areas located as near to the end of the runway as feasible?

- 8.18.3. Has each arm and dearm parking spot been marked? Have taxi guidelines been painted?
- 8.18.4. Are all aircraft armed and dearmed in the arm and dearm area if directed by local policy?
- 8.18.5. Are proper grounding points available in the arm and dearm areas?
- 8.18.6. Are there enough grounding points available?
- 8.18.7. Are aircraft grounded (including those with engines running) if loading and downloading in the arm/dearm area?
- 8.18.8. Is a serviceable fire extinguisher available IAW TO 00-25-172?
- 8.18.9. Is a fire fighting vehicle and crew on-hand, if required?
- 8.18.10. Do aircrews have their hands in plain view during all arm and dearm operations?
- 8.18.11. Has an operating instruction been published for arm/dearm operations? If so, are personnel aware of, and do they comply with, established guidance?
- 8.18.12. Do established procedures minimize exposure to forward firing ordnance?
- 8.18.13. Does the designated arm/dearm supervisor remain in plain view of the aircraft commander and monitor and control all operations?
- 8.18.14. Are only trained and qualified personnel used for arm/dearm procedures?
- 8.18.15. Are EOR inspections accomplished IAW applicable tech data?
- 8.18.16. Are there established procedures for handling aircraft with hung ordnance and (or) hot brakes?
- 8.18.17. Are the EOR kits in compliance with CTK program requirements?
- 8.18.18. Is the arm/dearm area kept clear of FOD?
- 8.18.19. Is supplemental lighting provided and used, if required for night time operations?

8.19. Aircraft Concurrent Servicing:

- 8.19.1. Concurrent servicing has become commonplace and proven safe at commercial airports. However, the following precautions will be followed:
 - 8.19.1.1. Simultaneous fuel and oxygen servicing on aircraft is NOT authorized.
 - 8.19.1.2. Winching of rolling stock and non-spark producing pallets is authorized during concurrent servicing, but passengers are not allowed in the cargo compartment.
 - 8.19.1.3. Only aircraft switches required for concurrent servicing operations will be operated.
- 8.19.2. Are the following requirements followed:
 - 8.19.2.1. Is defueling during concurrent operations limited to single point method?
 - 8.19.2.2. Is a qualified chief servicing supervisor (CSS) monitoring the operation with appropriate tech data?
 - 8.19.2.3. Are unnecessary personnel kept away from concurrent servicing operations?
 - 8.19.2.4. Is the area posted?

8.19.2.5. Do personnel ground themselves when entering the area? (Personnel will ground themselves frequently during actual refueling.)

8.19.2.6. Is a serviceable fire extinguisher positioned at the nose of the aircraft?

8.20. Maintenance Stands:

8.20.1. Guardrails must be installed and personnel will not be permitted to stand on the rails.

8.20.2. Stands must be in a good state of repair, clean, free of oil and grease, and clear of foreign objects.

8.20.3. At least two wheels must be locked when a maintenance stand is in use or unattended.

8.20.4. When in use, the pressure relief handle must be in the closed position. Weight limit for a maintenance stand is 500 pounds maximum or as labeled.

8.20.5. Maintenance equipment and work stands not actually required for work in progress will be removed from the parking area to suitable storage locations and cabled.

8.20.6. All locking devices and safety pins must be utilized when a platform is raised.

8.20.7. Personnel will not jump from stands to the aircraft.

8.20.8. Personnel will not stand on or use guard rails to gain additional heights.

8.21. Flight Line Vehicle Operations:

8.21.1. Vehicle inspection forms will be signed off daily before use.

8.21.2. All vehicle operators will be licensed with proper authorization to drive on the flight line and perform required tasks.

8.21.3. Except for "FOLLOW ME" guides, vehicles will not be driven into the path of a taxiing aircraft. (Vehicles will not be driven between aircraft and the "FOLLOW ME" guide.)

8.21.4. When vehicles re-enter paved flightline surfaces after being driven on an unpaved area, operators will stop and visually inspect and clean tires of any foreign objects.

8.21.5. Vehicle operators will give immediate right-of-way to approaching aircraft and emergency vehicles. (During marshaling, vehicles, support equipment, and support personnel, exclusive of essential block-in personnel, will remain clear and stationary until the aircraft chocks are in place before approaching the aircraft.)

8.21.6. Under no circumstances will personnel ride or walk between the aircraft nose and the tow vehicle, nor will personnel board or leave a moving aircraft or tow vehicle.

8.21.7. Headlights shining toward aircraft will be switched to parking lights until the aircraft is out of range.

8.21.8. Vehicles will approach parked aircraft with the driver's side towards the aircraft. Except in emergencies, vehicles will not be parked or driven closer than 25 feet in front, or 200 feet to the rear of any aircraft with engines running.

8.21.9. Vehicle pintle hooks will be serviceable, properly used, and closed and pinned when not in use.

- 8.21.10. Seatbelts will be used whenever the vehicle is in motion.
- 8.21.11. The following speed limits will be observed:
 - 8.21.11.1. General Purpose Vehicles—15 mph
 - 8.21.11.2. Special Purpose Vehicles—10 mph
 - 8.21.11.3. Operating in close proximity to aircraft—5 mph
 - 8.21.11.4. Aircraft towing speed (not to exceed 5 mph walking team members)
 - 8.21.11.5. Towing Power Units:
 - 8.21.11.5.1. Single Units 15 mph.
 - 8.21.11.5.2. Tandem Units 10 mph.
- 8.21.12. If required spotters will be used when backing vehicles. Spotters must be used and chocks pre-positioned when vehicles are backing, toward an aircraft.
- 8.21.13. Vehicle operators will observe runway “hold short” lines.
- 8.21.14. Security forces personnel should periodically monitor vehicle traffic.
- 8.21.15. Vehicle operators are prohibited from using the ramp as a shortcut to other places on the air-drome.
- 8.21.16. Personnel will use proper procedures for entering, exiting, or riding in the bed of a military truck. The tailgate will be lowered when passengers load or unload. The tailgate will be closed before the vehicle is put in motion. Personnel will ride seated in the bed and NOT with arms or legs outside the vehicle, nor will they ride seated with back against the tailgate.
- 8.21.17. Chocks will be in place and spotters used when backing fuel trucks around aircraft.
- 8.21.18. All vehicles, except responding emergency vehicles, will yield to taxiing aircraft and munitions-loaded vehicles.
- 8.21.19. Vehicles will not be stopped in front of aircraft loaded or being loaded with forward firing ordnance.
- 8.21.20. Vehicle operators will maintain communication with the tower when required (crossing runways, taxiways, etc.)
- 8.21.21. Flight line vehicles should have a control tower lights placard posted in plain view of the vehicle operator.
- 8.21.22. At night, operators will turn off vehicle headlights when taxiing aircraft approach.
- 8.21.23. Vehicles parked on the ramp at night will have properly working parking lights or emergency flashers turned on.
- 8.21.24. Operators of special purpose vehicles will be qualified and certified.
- 8.21.25. Unattended vehicles will have the ignition turned off, key in the ignition, and wheels chocked.
- 8.21.26. Prohibit personnel from sitting or laying on the ramp in the path of vehicle traffic flow.

8.21.27. Taxi lines on the ramp should be used as the median for vehicle operations whenever possible.

8.22. Driving Near Aircraft:

8.22.1. DO:

8.22.1.1. Approach parked aircraft with the driver's side toward the aircraft.

8.22.1.2. Park vehicles so they can depart in a forward direction—away from the aircraft.

8.22.1.3. Park vehicles in a way that eliminates the possibility of striking the aircraft if the vehicle inadvertently rolls forward or backward.

8.22.1.4. Park vehicles with the driver's side to the aircraft so that the vehicle is located clear of the wing tip in a position clearly visible to personnel in the cockpit.

8.22.1.5. Park all vehicles with:

8.22.1.5.1. Chocks in place (if required);

8.22.1.5.2. Ignition turned off;

8.22.1.5.3. Parking brake set;

8.22.1.5.4. Key in the lock; and

8.22.1.5.5. Transmission in reverse (manual) or park (automatic).

8.22.1.6. Use emergency flashers or parking lights, if flashers are not installed, when parked during the hours of darkness or inclement weather. Operators will take special care to assure vehicle battery will not be consumed. (Jumper cables should be readily available.)

8.22.1.7. Chock special purpose vehicles (SPV) when engines must be left running while the operator leaves the vehicle to operate equipment (i.e., baggage conveyors).

8.22.1.8. Chock aircraft ground equipment (AGE) if positive braking action is not functioning on a minimum of two wheels.

8.22.1.9. When SPV must operate under any portion of the aircraft:

8.22.1.9.1. Stop at least 10 feet from the aircraft.

8.22.1.9.2. Have the guide set the chocks.

8.22.1.9.3. Verify the overhead clearance.

8.22.1.9.4. Pre-position the chocks.

8.22.1.9.5. Proceed with caution.

8.22.1.9.6. Remove the pre-positioned chocks only after the SPV has departed 10 feet from the aircraft.

8.22.2. DON'T:

8.22.2.1. Operate a vehicle closer than necessary unless it is absolutely essential for mission accomplishment—in which case proceed with extreme caution and use a minimum of one guide.

8.22.2.2. Leave vehicles unattended with engine running.

8.22.2.3. Drive or tow equipment between aircraft unless there is adequate clearance between the aircraft's wingtips.

8.22.2.4. Drive SPVs under the wing of an aircraft unless required by TO to accomplish servicing.

8.22.2.5. Drive vehicles under any part of the aircraft.

8.23. Aircraft Operations—Flight Crew:

8.23.1. All baggage, life support equipment, chocks, etc., must be secured.

8.23.2. Scarves and rings will be removed prior to performing duties on or around the aircraft.

8.23.3. Gloves will be worn during cargo handling.

8.23.4. Crew members performing flying duties will not wear nylon web boots.

8.23.5. Do crews have required mission planning/preparation area?

8.23.6. Are procedures in place to provide aircrew with critical FCIF information?

8.24. Engine Running Onloads/Offloads (Passenger and Non-Passenger Carrying Cargo Aircraft):

8.24.1. All personnel will be properly briefed prior to the start of the operation.

8.24.2. Personnel will not stand directly behind cargo being off-loaded.

8.24.3. Hearing protection will be worn.

8.24.4. Passengers and equipment will be kept away from aircraft hazard zones (i.e., prop areas if applicable).

8.24.5. Maximum lighting will be utilized during night operations.

8.24.6. Reflective gear and lighted wands will be used during night operations.

8.24.7. Eye protection will be worn during engine running onloads/offloads (EROs) on unprepared surfaces or when there is a danger of blowing debris.

8.24.8. The load team will not approach the aircraft until all engines are in ground idle or reverse thrust. Vehicle operators will, under the direction of the load team chief, position the load a minimum of 25 feet aft and slightly to the right of the aircraft fuselage, leaving a clear 15-foot wide path behind the aircraft.

8.24.9. Personnel will not approach the aircraft during engine running on-load and off-load (ERO) until the thrust reversers (T/R) are open.

8.24.10. When approaching an aircraft during an ERO, personnel will position themselves at least 50 feet to the rear of the aircraft, move in a straight line to the taxi line, and turn and move towards the aircraft down the taxi line. (The reverse must be followed when leaving the aircraft after completion of an ERO. At no time will personnel expose themselves or cargo to aircraft jet blasts.)

8.24.11. Approved hearing protection will be worn during ERO operations.

- 8.24.12. The team chief will be in a position clearly visible to vehicle drivers when acting as the ground vehicle director.
- 8.24.13. Deplaning troops will be instructed to proceed a minimum of 50 feet aft of the aircraft before turning right or left and will continue laterally a minimum of 300 feet before stopping.
- 8.24.14. Only one piece of loading or material handling equipment will be directed to approach the aircraft at any one time.
- 8.24.15. Sufficient fire protection will be available per requirements in TO 00-25-172.
- 8.24.16. Is the senior fire fighter contacted to determine if a fire vehicle and crew is required?

8.25. Taxiing:

- 8.25.1. Speed should approximate a brisk walk not to exceed 10 mph.
- 8.25.2. Aircraft will not be taxied within 25 feet of an obstacle without a marshaler, and aircraft will never be taxied closer than 10 feet of an obstacle.
- 8.25.3. Aircraft will not be backed within 25 feet of an obstacle. Aircraft wings or tail will not pass over obstacles.
- 8.25.4. During the day, two marshaling paddles will be used by the marshaler; at night, two illuminated wands will be used. Marshalers must remain visible to the left seat pilot at all times.
- 8.25.5. While backing, no one will stand on or dangle feet from the aft ramp.
- 8.25.6. Spotters will be used in the flight deck windows whenever possible.
- 8.25.7. Wing-tip clearance guards will also use two light wands during night operations.
- 8.25.8. Are the following rules adhered to:
 - 8.25.8.1. Are flight engineers allowed to start, run, warm-up, and test helicopters only when the rotors are not engaged?
 - 8.25.8.2. Are aircraft not taxied closer than 100 feet of an active runway where aircraft are operating, unless they are taxiing on an established taxiway?
 - 8.25.8.3. Are wing walkers used when taxiing within 25 feet of an obstruction?
 - 8.25.8.4. Are aircraft prohibited from taxiing in excess of 10 mph in congested areas?

8.26. Engine Run-Ups:

- 8.26.1. For specific aircraft engine-run guidance refer to the aircraft specific TO and local directives.
- 8.26.2. Person on flight deck will monitor ground control and guard (if applicable).
- 8.26.3. Ensure proper chock placement. (Example: Chocks—4 minimum—are placed forward and aft of the forward main gear tires on C-130 aircraft [Left and right]).
- 8.26.4. No vehicles or equipment will be in front of the aircraft.
- 8.26.5. For engine runs above idle, ensure the aircraft is clear from behind.
- 8.26.6. Place flaps in the up position.

- 8.26.7. If it is necessary to run at power settings other than ground idle, make sure no aircraft is parked directly behind or directly in front of the aircraft.
- 8.26.8. The person supervising the run (usually the left seat operator) must physically check behind the run-up and all associated danger areas to ensure clearance.
- 8.26.9. Turn external aircraft lighting on.
- 8.26.10. All personnel will possess and use applicable checklists.

8.27. Aircraft Loading, Offloading and Cargo Marshalling:

- 8.27.1. Does the cargo checkpoint have a list of personnel authorized to sign Shippers Declaration for Dangerous Goods and a unit listing of all hazardous cargo on hand?
- 8.27.2. Is sufficient lighting available?
- 8.27.3. Do load team members and block-in and -out crews use luminous wands when marshalling during the hours of darkness?
- 8.27.4. Is a 5 mph speed limit posted and enforced in the marshaling area?
- 8.27.5. Do personnel remove jewelry when required?
- 8.27.6. Are leather work gloves worn when personnel handle cargo or equipment?
- 8.27.7. Is hearing protection worn on the flight line—either ear plugs, ear defenders, or both?
- 8.27.8. Are personnel prohibited from standing in front of equipment when loading aircraft?
- 8.27.9. Do marshalling yard personnel ensure all dunnage being shipped with cargo is adequately secured for flight?
- 8.27.10. Are personnel prohibited from walking in front of moving aircraft or vehicles?
- 8.27.11. Are personnel prohibited from lying or sleeping on the ramp at night?

8.28. Deicing:

- 8.28.1. Are aircraft deiced in the following manner:
 - 8.28.1.1. If deicing is performed while engines or auxiliary power units are running, ensure fluid is not applied or directed in a manner where the over-spray will contact engine intakes or sources of exhaust.
 - 8.28.1.2. All doors, hatches, and canopies are secured prior to deicing operations.
 - 8.28.1.3. Deicing fluid is not used to remove heavy accumulations of snow. (The snow absorbs the fluid and forms a slush that is difficult to remove. After snow is removed from the aircraft, a layer of rough ice remains, which can be quickly dispatched with deicing fluid.)
 - 8.28.1.4. Since deicing fluid is mildly toxic, are persons near the aircraft when it is being deiced placed upwind (as much as possible) of the application area?
 - 8.28.1.5. Before snow or ice removal from the empennage of the aircraft, are the stabilizers placed in the up position and the elevators in the down position? (If possible, the stabilizer and ele-

vator should remain in this position for approximately 12.5 minutes to permit the draining of fluids from the surface.)

8.28.1.6. As much as possible, is the deice truck placed in position to remove ice from the leading edge first?

8.28.1.7. Is the spray of deicing fluid directed onto surfaces to be cleaned? The following actions should be taken:

8.28.1.7.1. Do not direct the melted ice, snow, or slush into balance bays and do not allow stream to enter balance bays or be applied directly to honeycomb surfaces.

8.28.1.7.2. Ensure balance bays are clear of accumulated snow and ice.

8.28.2. Is the aircraft canopy or windshield cleaned before taxiing?

8.28.3. Deicing operations will be conducted IAW applicable technical data.

NOTE: Ensure deicing fluid does not drain into open bodies of water (ditched, streams, lakes, etc.) where it may pollute and endanger aquatic life. Deicing fluid should be contained and treated before discharge, when feasible.

8.29. Aircraft Hangar, Shelter, And Nose Dock Operations:

8.29.1. Because working space is limited in hangars, the potential for tripping and falling over power cords, compressed air lines, and parts is ever present. Is the hangar cleared, as much as possible, of these hazards?

8.29.2. Many tasks require manual lifting, some in awkward positions that can be stressful to body parts. Are proper lifting techniques used and, when possible, help given to accomplish the task?

8.29.3. Do hangar doors operate properly, with working audible warning?

8.29.4. Do individuals clean up the tools and equipment they have used and ensure tripping hazards are eliminated from work areas?

8.29.5. Are aircraft panels, cowlings, and other parts relocated to storage areas when not in use?

8.29.6. Are electrical cords and compressed air lines placed in storage areas when not in use?

8.29.7. When walking or working on aircraft in hangars, nose docks, shelters, etc., or when workers perform maintenance on exterior aircraft surfaces that are over 10 feet in height, is fall protection used?

8.29.8. Are safety harnesses, when used, inspected prior to use?

Chapter 9

WEAPONS

9.1. Aircraft and Munitions Beddown. Minimum information included here is provided for use to assess combat and hot cargo aircraft parking and munitions beddown at the deployed location. Gather as much information as possible about the deployed location prior to departure. Consider the following: scaled maps, number of aircraft and type, maximum munitions load per aircraft type, munitions storage and operations requirements by Net Explosives Weight (NEW), storage compatibility group, cubic feet, etc. Also see AFMAN 91-201, *Explosive Safety Standards*.

9.1.1. Site Survey and Deployable Tools. The following list of recommended items is provided for those members that will be responsible for weapons safety, explosive site planning, and related duties while deployed. Also, check MAJCOM and local safety guidance prior to deployment for unique requirements.

9.1.1.1. Laptop computer.

9.1.1.2. Digital camera.

9.1.1.3. Applicable technical data. (DoD 6055.9-STD, *DoD Ammunition and Explosives Safety Standards*, AFI 32-1065, *Grounding Systems*, AFI 91-202, AFI 91-204, AFMAN 91-201, AFH 32-1084, *Facility Requirements*, etc.)

9.1.1.4. Laser range finder or measuring device (500' tape measure or measuring wheel.)

9.1.1.5. Metric conversion chart.

9.1.1.6. Calculator. (Scientific Calculator)

9.1.1.7. Ruler. (Drafting Ruler: Standard Engineering and Metric)

9.1.1.8. Compass. (Drawing Compass and Protractor)

9.1.1.9. Points of contact listing at the deployed location.

9.1.1.10. Maps. (See MAJCOM or Host Nation)

9.1.1.11. Drafting Set. (Equivalent to NSN 6675-00-926-4360)

9.1.1.12. Electronic or Blank Forms. (AF Form 943, **Explosive Safety Site Plan**, AF Form 2047, **Explosives Facility License**.)

9.1.2. Consider or develop the following for aircraft parking:

9.1.2.1. Aircraft parking plan.

9.1.2.2. Aircraft footprint.

9.1.2.3. Maximum NEW per aircraft type and (or) minimum fragment distance for munitions.

9.1.2.4. Forward firing munitions.

9.1.2.5. Aircraft intermagazine (IM) parking distance or grouped IM parking distance.

9.1.2.6. Hot cargo pad.

9.1.2.7. Flightline munitions holding area.

- 9.1.2.8. Arm/Dearm areas.
 - 9.1.2.9. Hot Gun areas.
 - 9.1.2.10. Hung Ordnance areas.
 - 9.1.2.11. Munitions Storage Area (MSA)
 - 9.1.2.12. If any, easements surrounding the base.
 - 9.1.2.13. Host nation potential explosive and (or) exposed sites. (Do host nation assets present a hazard to US assets and vice versa?)
 - 9.1.2.14. Airfield explosive movement routes.
 - 9.1.2.15. Aircraft munitions jettison areas.
 - 9.1.2.16. Electromagnetic radiation hazards.
- 9.1.3. Consider or develop the following for munitions storage areas:
- 9.1.3.1. Number and types of structures available for use.
 - 9.1.3.2. Distances between structures.
 - 9.1.3.3. Munitions storage capabilities. (Consider NEW, storage compatibility groups, cubic feet and initial and sustained munitions operational requirements. Determine physical capacity and NEW. When determining cubic feet available for each structure, consider stacking limitations when assessing barricaded locations.)
 - 9.1.3.4. If used, barricades that meet requirements.
 - 9.1.3.5. Quantity-distance to maintain during planning and employment of combat forces: (1) maintaining IM separation, (2) meeting intraline separation, (3) protecting related personnel, and (4) unrelated personnel.
 - 9.1.3.6. Operating locations. (Bomb build-up, rockets, missiles, etc.)
 - 9.1.3.7. Grounding requirements.
 - 9.1.3.8. Availability of lightning protection systems. If unavailable, evacuation plans in the event of lightning or a thunderstorm.
 - 9.1.3.9. Electromagnetic radiation hazards.
 - 9.1.3.10. Easements.
 - 9.1.3.11. A location for very high risk and high risk munitions storage.
 - 9.1.3.12. Road conditions for munitions transporting vehicles.
 - 9.1.3.13. Available space for loading, unloading, and storage of empty ISO containers.
 - 9.1.3.14. Inert storage space.
 - 9.1.3.15. Host nation potential explosive and (or) exposed sites. (Do host nation assets present a hazard to US assets and vice versa?)
 - 9.1.3.16. Suspect vehicle and vehicle inspection areas.
 - 9.1.3.17. Munitions holding area in the storage area if not available on the flightline.

9.1.3.18. Explosive movement routes to the flightline, a railhead, etc.

9.1.3.19. Locations for munitions control, operations, flight supervision, etc.

9.1.4. Other Considerations:

9.1.4.1. For off-base delivery of munitions identify the nearest railhead and (or) port, determine the maximum NEW, and identify inhabited buildings and public transportation routes.

9.1.4.2. Identify a suitable explosives ordnance disposal (EOD) range.

9.1.4.3. Memorandum of Agreement. If the airfield and (or) munitions storage area will be joint use, ensure that an appropriate memorandum is written and staffed through the appropriate command channels. The agreement should clarify issues pertaining to facilities authorized for use, host or tenant provided services, operational constraints, etc.

9.1.5. Risk Assessment. Upon explosives safety survey completion identify all explosive safety violations, implemented compensatory measures and assess the risk. Present a documented risk assessment to responsible Air Force commanders and other host nation or other service component commanders. Ensure commanders are aware of explosives hazards and specific risks personnel and resources are being exposed to. Document compensatory action taken to abate hazards.

9.2. Ammunition and Explosives:

9.2.1. General Precautions: (See AFMAN 91-201, General Guidance, [Chapter 2](#))

9.2.1.1. Expose only the minimum number of people to the minimum amount of explosives for the minimum amount of time.

9.2.1.2. Handle ammunition carefully. Containers must not be tumbled, dropped, thrown, rolled, or dragged (unless designed for dragging).

9.2.1.3. Make provisions to evaluate and, if necessary, segregate damaged ammunition.

9.2.1.4. Caution personnel not to disassemble or destroy enemy equipment or ammunition without authorization. Unknown ammunition stocks should be carefully examined by ordnance experts before demolition or shipment.

9.2.1.5. Determine if the area of operations is susceptible to electrical storms and establish lightning-protection procedures.

9.2.1.6. Monitor suspension and restriction notices. Suspended lots should be visibly marked and physically separated from serviceable load.

9.2.1.7. Ensure personnel know NOT to remove ammunition from its packaging until necessary. Ammunition containers provide protection from hazards such as moisture and static electricity.

9.2.1.8. Wear eye protection and leather gloves when working with banding materials or wooden boxes.

9.2.1.9. Keep the area within 50 feet of ammunition clear of vegetation, refuse, empty packing materials, and other hazards that could cause a fire to spread to the ammunition.

9.2.1.10. Keep water filled barrels or tubs at locations where white phosphorus (WP) or powdered white phosphorus (PWP) ammunition is kept. These barrels and tubs are used to immerse leaking WP or PWP round and for first-aid for WP or PWP burns.

9.2.1.11. Store ammunition in dugouts or depressions below ground level to reduce exposure to heat.

9.2.2. Unexploded Ordnance (UXO):

9.2.2.1. Remind personnel not to touch, pick up, attempt to disarm, or otherwise disturb any UXO, dud ordnance, or any unknown object they might come across. Tell them to mark the location to warn others and report it immediately to Explosive Ordnance Disposal (EOD) through their chain of command.

9.2.2.2. Do not allow personnel to collect duds for souvenirs.

9.2.2.3. Notify adjacent units prior to EOD destroying UXO to avoid transmission of false alarms. Remind personnel to:

9.2.2.3.1. Make any radio transmission at least 25 feet away for hand-held and 100 feet away for mobile radios from a UXO hazard.

9.2.2.3.2. Do not move toward a suspected UXO. Some types have magnetic or motion-sensitive fuses and will detonate when they detect a target. Other types have self-destruct timers.

9.2.3. Fire Precautions:

9.2.3.1. Ensure smoking is not permitted within 50 feet of explosives and that flame producing devices are turned over to entry control in areas containing exposed explosives.

9.2.3.2. Ensure fire extinguishers (at least two portable 2A:10BC Rated) are present whenever ammunition is handled, stored, or transported.

9.2.4. Loading Precautions:

9.2.4.1. Ensure vehicle brakes are set and the engine is turned off during loading and unloading. If the vehicle is parked on any grade or ramp steep enough to cause vehicle to roll chocks will be used.

9.2.4.2. Ensure ammunition weight is evenly distributed and the load is secured to prevent movement.

9.2.4.3. Ensure vehicles and trailers loaded with ammunition are parked at least 50 feet from vehicles and trailers loaded with flammable liquids.

9.2.5. Storage Precautions:

9.2.5.1. Protect ammunition, particularly unpackaged ammunition, from direct sun. However, tarpaulins or other covers placed directly on ammunition can cause deterioration, so a ventilation space must be provided.

9.2.5.2. Disperse ammunition to minimize loss in the event of fire, accidental explosion, or enemy action.

9.2.5.3. Conform to quantity-distance standards for storage of ammunition and explosives.

9.2.5.4. Ensure that captured ammunition and ammunition of unknown origin is examined, evaluated, and classified by qualified personnel and stored in a designated collection point.

9.2.5.5. When storing ammunition, use sand dunes, barriers, buildings, and so forth to prevent propagation and to protect personnel and material from the effects of an explosion.

9.2.6. Pyrotechnics:

9.2.6.1. Ensure personnel know that simulator flash powder ignites instantly and explosively and that simulators should not be exposed to intense heat and direct sunlight. Remind personnel never to cut open or hand-ignite these devices and to mark duds and seek EOD guidance for handling and disposal.

9.2.6.2. Remind personnel, while training, not to throw or detonate simulators, flares, or smoke devices near troops, tents, vehicles, or other flammable or combustible materials. (See AFMAN 91-201, Para 2.15. for published safety guidelines.)

9.2.6.3. Remind personnel to roll down sleeves and wear gloves and helmets when using simulators.

9.2.7. Small Arms Handling:

9.2.7.1. General:

9.2.7.1.1. Construct "clearing barrels" at first-aid stations, mess tents, and other appropriate areas. Enforce clearing barrel instructions are posted and that proper clearing procedures are followed.

9.2.7.1.2. Ensure fields of fire at guard points do not fall into friendly positions.

9.2.7.1.3. Ensure Special Forces and AF personnel are proficient in combat identification and rules of engagement.

9.2.7.2. Maintenance:

9.2.7.2.1. Establish weapons lubrication policy.

9.2.7.2.2. Require that weapons, ammunition, and magazines are kept clean.

9.2.7.2.3. Require that muzzles be covered to prevent clogging.

9.3. Weapons Safety Spot-inspection Checklist:

9.3.1. Are explosive storage facilities located where they expose the least number of personnel and resources?

9.3.2. Has AF Form 2047, been issued where applicable?

9.3.3. Does the proposed licensed facility meet all requirements of AFMAN 91-201, paragraph 2.35.?

9.3.4. Unless otherwise directed by the fire chief, are a minimum of two serviceable fire extinguishers, suitable for the hazards involved, provided for immediate use at any location where explosives are handled?

9.3.5. Are all fire control selector switches set in the OFF, SAFE or Normal position?

9.3.6. Are the armament circuit breakers pulled?

9.3.7. Are mechanical safing devices installed?

9.3.8. Is the armament master switch set to the SAFE position?

9.3.9. Are bomb release and jettison switches set in the OFF, SAFE or Normal position?

9.3.10. Have all guns been safed electrically and mechanically?

- 9.3.11. Is the aircraft properly positioned, chocked, and grounded?
- 9.3.12. Is fire-fighting equipment available and serviceable?
- 9.3.13. Did the team chief conduct a safety briefing prior to the loading operation?
- 9.3.14. Are aircraft maintenance operations prohibited during loading?
- 9.3.15. Are personnel prohibited from wearing clothing that generates static electrical charges in violation of standards?
- 9.3.16. Is the aircraft armament status recorded on AFTO Forms 781A and H?
- 9.3.17. Was the fire department notified of the aircraft status after loading and downloading?
- 9.3.18. Are local written procedures available for all phases of munitions operations?
- 9.3.19. Is procedural information provided by the host unit to include:
 - 9.3.19.1. A copy of all applicable joint-use and sole-use facilities with net explosive weight (NEW) limits and other special provisions;
 - 9.3.19.2. Climatic conditions;
 - 9.3.19.3. Local regulations that may affect the deployed unit's operations;
 - 9.3.19.4. Aerial photos, if available; and
 - 9.3.19.5. A current and future (if applicable) base explosives location map.
- 9.3.20. Has the weapons safety representative reviewed the OPLAN requirements?
- 9.3.21. Did weapons safety personnel participate in pre-deployment site surveys?
- 9.3.22. Are locations designated and sited for storage, buildup, and munitions loading operations?
- 9.3.23. Do plans address pertinent explosives safety information of all explosives operations and locations required for the contingency tasking?
- 9.3.24. Are high interest area inspections accomplished at locations or operations where major potential has been identified by inspections or mishap investigations:
 - 9.3.24.1. Arm and dearm operations.
 - 9.3.24.2. All missile operations.
 - 9.3.24.3. Preload facilities and operations.
 - 9.3.24.4. Combat turnaround operations.
 - 9.3.24.5. Compliance with locally administered imposed restrictions to explosives operations.
- 9.3.25. Are spot inspections conducted on all explosives operations and locations including the following high-interest areas? **NOTE:** Spot inspections must include operations at other than normal duty hours (i.e., night operations).
 - 9.3.25.1. Maintenance, storage, alert, and operating locations.
 - 9.3.25.2. Flight line explosive operations.
 - 9.3.25.3. Weapons maintenance activities.

- 9.3.25.4. Licensed locations (i.e., egress, life support, and armament shops).
- 9.3.26. Are follow-up inspections conducted to ensure corrective actions are adequate?
- 9.3.27. Are smoking areas properly identified by an approval letter from the fire chief:
- 9.3.27.1. Are suitable butt cans available?
 - 9.3.27.2. Are "No Smoking" signs posted where required?
 - 9.3.27.3. Is a serviceable fire extinguisher available?
- 9.3.28. Are the following considered for Licensed Explosives Facilities:
- 9.3.28.1. Has the commander approved local written procedures as the authorization for operations involving licensed explosives?
 - 9.3.28.2. Are the proper fire and hazard symbols posted on the entrance to the licensed facility?
 - 9.3.28.3. Is the fire department notified of the current symbols?
 - 9.3.28.4. Is the current approved explosives license posted?
 - 9.3.28.5. Are only the type and quality of explosives authorized on the license present?
 - 9.3.28.6. Are explosives properly stored in their approved Department of Transportation (DOT) containers and do they comply with environmental limitation (ventilation, direct sunlight, moisture)?
 - 9.3.28.7. Are the required extinguishers identified on the license available and serviceable?
 - 9.3.28.8. Are the personnel limits posted and adhered to?
 - 9.3.28.9. Are unserviceable items adequately segregated and identified?
 - 9.3.28.10. Does housekeeping provide a safe environment?
 - 9.3.28.11. Is security of munitions adequate?
 - 9.3.28.12. If a storage locker is used, is it used only for the storage of explosives?
 - 9.3.28.13. Is the required protective equipment available for individuals performing operations involving chemical munitions?
 - 9.3.28.14. Are NEW limitations for licensed ammunition and explosives storage locations enforced not to exceed HC/D (02), (03) or (04) 1.2 or 1.2.2 up to 50 pounds NEW, or HC/D 1.3 up to 100 pounds NEW, and HC/D 1.4, operational limit? Combined storage of HC/D(02), (03) or (04)1.2 and 1.3 is limited to 100 lbs NEW not to exceed 50 lbs HC/D1.2.
 - 9.3.28.15. If HC/D (02), (03) or (04)1.2 is stored inside, are proper barricades in place (one-fourth inch mild steel or sand bags totally enclosing the item)?
- 9.3.29. Are the following considered for Arm And Dearm Areas:
- 9.3.29.1. Has an area been designated for the safe arming and dearming of aircraft?
 - 9.3.29.2. Do parked aircraft face clear areas during arming and dearming operations?
 - 9.3.29.3. Are arm and dearm personnel qualified according to local directives?

- 9.3.29.4. Are published operating instructions prepared for ground handling of aircraft with hung ordnance?
- 9.3.29.5. Are wheels chocked prior to commencing arm and dearm operations?
- 9.3.29.6. Do aircrews have their hands visible to ground personnel during all arming and dearming operations?
- 9.3.29.7. Are bomb dispensers, and rocket launchers checked in the arm and dearm area for unexpended ordnance?
- 9.3.29.8. Is sufficient fire protection available as outlined in TO 00-25-172?
- 9.3.30. Are the following considered for transportation of explosives:
 - 9.3.30.1. Are tie-down procedures in use?
 - 9.3.30.2. Are the appropriate placards in use?
 - 9.3.30.3. Is the vehicle checked for serviceability?
 - 9.3.30.4. Are the appropriate fire extinguishers serviceable and available?
 - 9.3.30.5. Is the emergency procedures checklist available and in use?
 - 9.3.30.6. Are vehicle operators carefully selected, adequately trained and tested, and properly informed of the explosives hazards involved?
 - 9.3.30.7. Have the primary and alternate explosives movement routes been identified and used?
 - 9.3.30.8. When dictated by operating conditions, do gasoline or diesel-powered units have exhaust system spark arrestors and, where applicable, carburetor flame arrestors (standard air cleaners)?
 - 9.3.30.9. Are all electrical connections securely fastened to prevent accidental disconnection?
 - 9.3.30.10. Is gasoline- or diesel-powered equipment parked outside explosives storage buildings or sites when not in use?
 - 9.3.30.11. Are vehicles chocked, hand brakes set, engine turned off, and transmission placed in the lowest forward gear when unattended and during load and download operations?
 - 9.3.30.12. Are all refueling operations conducted at least 100 feet from explosives locations prior to loading?
 - 9.3.30.13. Are personnel NOT allowed to ride on or in the cargo portion or compartment of motor vehicle transporting explosives unless approved by local OI or authorized by AFMAN 91-201?
 - 9.3.30.14. Is smoking prohibited within 50 feet of an explosives-loaded vehicle?
- 9.3.31. Are the following considered for explosives holding areas:
 - 9.3.31.1. Is the area enclosed by rope or some other means to prevent unauthorized traffic from entering the area?
 - 9.3.31.2. If the area is used at night, is it clearly identified by reflectorized materials?
 - 9.3.31.3. Are appropriate fire and hazard symbols posted?
 - 9.3.31.4. Was the fire department notified?

9.3.31.5. Is the area free of combustible materials?

9.3.31.6. Are fire extinguishers immediately available and suitable for the hazards involved?

9.3.31.7. Are water barrels and a safety kit available where WP munitions are stored?

9.3.31.8. Are the brakes set on vehicles and trailers loaded with explosives and is one wheel chocked?

9.3.32. Are the following considered for other areas:

9.3.32.1. Are mobility plans and site plans for deployed locations concerning explosives operations (hot cargo pad, onload and offload locations, transit storage, and armories) reviewed and approved?

9.3.32.2. Have procedures been established so emergency response units (fire and crash rescue) are notified of inbound and outbound hazardous cargo?

9.3.32.3. Have procedures been developed to notify the Fire Department when explosives loading and unloading occurs?

9.3.32.4. Have procedures been established for suspension of explosives operations when an electrical storm is within 5-nm miles? (Refer to paragraph 12.8.)

9.3.32.5. Are operators of explosives-laden motor vehicles and MHE explosives trained?

9.3.32.6. Are two serviceable fire extinguishers, suitable for the hazards involved, available?

9.3.32.7. Are fire symbols displayed on sides, front, and rear of vehicles and MHE transporting explosives?

9.3.32.8. Are explosives properly secured to MHE and vehicles to prevent movement?

9.3.32.9. Are fire symbols posted at aircraft? (**NOTE:** Fire symbols should be placed at nose, tail, and sides of aircraft, unless the entire CAPA is posted.)

9.3.32.10. Are serviceable flight line fire extinguishers available and readily accessible at each explosives loaded aircraft?

9.3.32.11. Is smoking prohibited within 50 feet of explosives at all times?

9.3.32.12. Is aircraft refueling prohibited during explosives loading and unloading? (**NOTE:** Motor vehicles and MHE transporting explosives should remain 100 feet away during refueling.)

9.3.32.13. Are aircraft engines stopped before loading and offloading of explosives? (**NOTE:** ERO procedures are not approved unless authorized in exercise operations order or contingency air tasking order.)

9.3.32.14. Are troop commanders and loadmasters knowledgeable of individual issue ammunition restrictions?

9.3.32.15. Are aircraft commanders or their representatives briefed on all hazardous cargo being loaded on the aircraft?

9.3.32.16. Is hazardous cargo annotated on the flight plan?

9.3.32.17. Are the personnel involved with explosives operations properly trained? Do they understand the hazards associated with the operation and the munitions involved? Have they been properly briefed?

Chapter 10

COMMUNICATIONS

10.1. Introduction. Working near, installing, and repairing communications and electrical equipment present potential hazards to personnel. The following checklist addresses minimal safety requirements.

10.2. Antennas:

- 10.2.1. Remind personnel that, when erecting antennas, they must stay *twice* the distance from power lines as the length of the antenna.
- 10.2.2. Stress that personnel have been killed by falling antenna-head sections.
- 10.2.3. Require that personnel wear eye and face protection and gloves when erecting antennas.
- 10.2.4. Allow no substitutes for antenna-mast sections (camouflage poles have been a fatal alternative).
- 10.2.5. If, for any reason, an assembled antenna-head must be left on the ground, ensure it is guarded to prevent others from walking into it. Tip protectors are a must.
- 10.2.6. Ensure radio frequency radiation hazard distances prescribed by technical data are marked and access is restricted.

10.3. Power Lines:

- 10.3.1. Identify power lines in operational areas to *all personnel*.
- 10.3.2. Tie down antennas when in areas of power lines (antenna tip should be no lower than 7 feet to avoid eye injuries). Use tip protectors at all times.
- 10.3.3. Ensure electrical service lines comply with AFMAN 91-201, para 2.48.

10.4. Electrical Storms:

- 10.4.1. If possible, do not operate radios, telephones, or switchboards during electrical storms.
- 10.4.2. Disconnect electrical equipment from power sources and antennas, if the situation permits.
- 10.4.3. If equipment must be used, converse as little as possible. Return the call after the storm.

Chapter 11

TOOLS

11.1. Heat Effects on Tools and Materials:

11.1.1. Ensure gloves are worn when working with metal tools and materials exposed to the sun in hot climates.

11.1.2. Remind personnel to:

11.1.2.1. Take into account expansion and contraction of metal tools and materials. (Metal will contract during cool nights and expand during hot days).

11.1.2.2. Check wire rope and bolt torque specifications to minimize varying heat stress and strain effects.

11.1.2.3. Keep sawdust cleaned up in carpentry areas. Sawdust fires occur frequently in hot, dry climates.

11.1.2.4. Frequently inspect wooden items such as shovel, ax, and hammer handles for shrinkage from extreme heat and low humidity. Check and tighten as needed.

11.2. Tools Checklist:

11.2.1. Are consolidated tool kits (CTK) in good condition?

11.2.2. Are missing or broken tools replaced?

11.2.3. Are inventories of tools completed?

11.2.4. Are tool boxes not used to collect foreign objects?

11.2.5. Is a tool control program established?

11.2.6. Does each tool have a cutout to show if it is missing?

11.2.7. Are all CTKs, tools, or equipment not in their designated location accounted for by means of a chit, sign-out log, hand receipt, etc.?

11.2.8. Is a CTK-continuity folder maintained according to existing directives?

11.2.9. Are lost tool reports properly and promptly filled out?

11.2.10. Are required special tools and test equipment available?

11.2.11. Have procedures been established to track due dates on calibration of special equipment or measuring tools in use?

11.2.12. Are the calibration and condition of precision measuring equipment in use and (or) located in the CTK tool room checked?

11.2.13. Have adequate bench stocks been established? Are items controlled, properly maintained, and separated into bins?

11.2.14. Are adequate copies of pertinent technical orders available and are they in serviceable condition and current?

11.2.15. Have procedures been established to check calibration of tire gauges before and after use and to document these checks?

Chapter 12

CLIMATE AND WEATHER CONDITIONS

12.1. Climate and Weather.

12.1.1. Environmental Considerations. Unfamiliar environmental conditions can severely affect deployment and contingency operations. Environmental extremes usually require specialized techniques, procedures, and equipment. Every effort should be made to determine the appropriate measures and equipment that may be needed at the deployed location to protect workers and minimize the impact of the environment.

12.2. Worldwide Considerations . Planning guidelines for the effects of climate and weather vary with the location of the contingency.

12.3. Desert Areas and Southwest Asia (SWA.)

12.3.1. Hot-dry conditions are found in desert climates and it is not uncommon for temperatures to exceed 100 degrees Fahrenheit daily for long periods. Substantial desert areas on all continents have long periods where temperatures well above 100 degrees Fahrenheit may exist during the hottest months. Operating equipment in direct sunshine can expose workers to temperatures 30 to 50 degrees higher than the shade temperature.

12.3.2. Since SWA receives very little rain, precipitation is not considered as a significant factor. However, sudden and intense rains occurring several miles away may cause flash flooding in another distant location. Operations in areas where there is a potential for standing water after a rainfall should be avoided. A thorough terrain analysis should reveal natural drainage swales subject to flash flooding.

12.3.2.1. Winds in SWA and other desert climates can achieve almost gale force and blowing dust and sand can make life almost intolerable, any type of activity difficult, and restrict visibility to a few yards. Strong winds are invariably followed by rapid changes in temperature.

12.3.2.2. Burial of utility lines, and shading of fuel bladders, generators, and vehicles should be considered to reduce the effects of intense sunlight in desert climates. Cool areas where personnel can retreat during breaks or work-rest periods should also be established.

12.4. Temperate Zones. The temperate zone extends throughout the world and, very generally, includes the variable climates of the middle latitudes, between the extremes of the tropical and frigid climates. Climates are typically seasonal and can range from hot-dry and cold regions. Rains may be accompanied by gusty winds during much of the year. Snow and icing conditions are not uncommon in these areas during the winter months. During fall, winter, and early spring, fog may be common and visibility can be severely restricted.

12.5. Tropical Zones. Wet-warm regions in the tropical zone coincide with the major tropical rain forest areas of the world. Wet-warm to hot conditions prevail characterized by high temperature and humidity, and intense solar radiation. Low temperatures do not occur, but chilly days and nights are common. In some tropical areas, in winter months (the reverse season below the equator), the nights are cold enough to require a wool blanket for sleeping. Rainfall in many parts of the tropics is much greater than that in

most areas of the temperate zones. Tropical downpours usually are followed by clear skies, and in most places the rains are predictable at certain times of the day. Except in those areas where rainfall may be continuous during the rainy season there are not many days when the sun does not shine at least part of the time.

12.6. Frigid Zone. Frigid zone conditions are found in the northern hemisphere. Deep snow, permafrost, seasonally frozen ground, frozen lakes and rivers, glaciers, and extreme cold characterize these far northern regions. Besides climatic effects, vast distances and isolation can influence bare base operations in northern areas. Frequent high winds and either very short or very long periods of daylight prevail. There is constant need for shelter and heat, increased dependence on special equipment and materials, and a need for special winter clothing. Cold temperatures make even simple tasks very difficult. During the summer, this zone may be characterized by numerous and extensive swamps, lakes, rivers, abundant insects, and at times, continuous daylight. Spring hazards include flash floods from melting snow and ice. Freeze-thaw cycles occur frequently. Personnel accustomed to operating in warm weather should be properly trained and prepared for frigid conditions, which should include operation of special-purpose equipment such as snow removal machinery and portable duct heaters. This training should also include winterization of standard bare base assets. Operation and maintenance of vehicles, power equipment, and utility systems in very low temperatures is difficult. Extreme cold may result in rapid deterioration of metal, plastic, and other materials. Special lubricants may be required, as well as antifreezes, protective covers, and warming equipment.

12.6.1. Temperatures. While temperatures vary considerably between locations during the winter season, six continuous hours with an ambient air temperature of minus 50 degrees Fahrenheit can be expected in the extreme northern parts of the frigid zone. Summer maximum temperature expectancy is 95 degrees Fahrenheit, well inland.

12.7. Adverse Weather Conditions. Deployed weather personnel or the base weather station (BWS) is responsible for making the initial notification to pre-determined support agencies of adverse weather conditions. Adverse weather conditions include: strong surface winds, heavy rain, freezing precipitation, and thunderstorms (i.e., frequent dangerous lightning, damaging winds, and hail).

12.8. General Lightning Safety for All AF Activities and Operations:

12.8.1. When lightning is detected or observed within the immediate vicinity of any activity or operation, do not go out of doors or remain out unless it is absolutely necessary. Take appropriate precautions even though the thunderstorm may not be directly overhead. If you are caught outside:

12.8.1.1. Do not stand near a tall isolated tree or a telephone pole.

12.8.1.2. Avoid projecting above the surrounding landscape. For example, don't stand on a hilltop.

12.8.1.3. In a forest, seek shelter under a thick growth of small trees.

12.8.1.4. In open areas, go to a low place, such as a ravine or valley.

12.8.1.5. Get off or away from open water, metal equipment, or small metal vehicles.

12.8.1.6. Avoid metal objects including fences, metal pipes, electrical lines, equipment, etc.

12.8.1.7. If you are in a group in the open, spread out, keeping people several yards apart.

12.8.1.8. If you are caught in a level field or prairie far from shelter and you feel your hair stand on end, lightning may be about to strike. Crouch down with feet and knees together hunched slightly forward and place your hands over ears to minimize potential hearing damage from thunder. **DO NOT LIE FLAT ON THE GROUND.**

12.8.2. Seek shelter as follows:

12.8.2.1. Dwellings or other buildings that are protected against lightning;

12.8.2.2. Protected underground shelters;

12.8.2.3. Large metal-framed buildings;

12.8.2.4. Enclosed automobiles, buses, aircraft, and other vehicles with metal tops and bodies;

12.8.2.5. Streets that may be shielded by nearby buildings.

12.8.3. Certain locations are extremely hazardous during thunderstorms and these should be avoided:

12.8.3.1. Hilltops and ridges;

12.8.3.2. Areas on top of buildings;

12.8.3.3. Under isolated trees;

12.8.3.4. Near electrical appliances, telephones, plumbing fixtures, and metal or electrically conductive objects; and

12.8.3.5. Aircraft dry bays, tanks, and wheel wells.

12.8.4. Each Deployment Commander will ensure a local procedure is developed to advise key personnel and notify agencies involved in high-risk weather activities and operations. Normally, these agencies are those having aircraft, POL facilities, open-air work and recreational activities, and underground utilities work. Key personnel, in turn, will advise all on-duty supervisors to take proper precautions and timely actions.

12.8.5. Each location will have a lightning safety program with a two-tier notification system to minimize personnel exposure to lightning hazards.

12.8.5.1. A *Lightning Watch* is in effect 30 minutes prior to thunderstorms being within a 5-nautical mile (nm) radius of any pre-determined location or activity as forecast by the BWS or deployed weather personnel. **NOTE:** Lightning is a direct product of a thunderstorm. During a *Lightning Watch*, accomplish the following:

12.8.5.1.1. Continue operations or activities; however, ensure all personnel are prepared to implement *Lightning Warning* procedures without delay.

12.8.5.1.2. Be alert for any lightning activity, to include audible thunder, and advise supervisory personnel of any observations.

12.8.5.2. A *Lightning Warning* is in effect whenever any lightning is occurring within a 5-nm radius of the pre-determined locations and activities. Personnel in affected locations or engaged in affected activities will take the following actions:

12.8.5.2.1. Cease all outside activities and seek shelter.

12.8.5.2.2. Recommended locations that provide safe shelter and locations to avoid are listed in paragraphs [12.8.2.](#) and [12.8.3.](#)

12.8.5.3. If lightning does not occur within a 5-nm radius at the valid (forecast) time of the Lightning Watch, BWS or deployed weather personnel will reassess the Lightning Watch and amend as needed. Lightning Warnings will be canceled when the thunderstorms have passed beyond the 5-nm radius of the location or activity. A Lightning Watch will not be canceled if there is potential for more thunderstorms within 30 minutes.

12.8.5.4. All aircraft fuel servicing and maintenance activities (including Liquid Oxygen [LOX] servicing) will cease whenever a Lightning Warning is in effect. **EXCEPTIONS:** Vehicle movements (including refuelers) and pipeline transfers (including bulk storage to hydrant tanks).

12.9. Safeguarding Aircraft During High Winds. Serious structural damage to aircraft can be caused by high velocity surface winds. When possible, aircraft will be evacuated to safe weather areas when tornadoes, hurricanes, or unusually high winds are predicted. Locally established high wind safety precautions or plans will be developed and observed along with the guidance presented below:

12.9.1. Taxiing Aircraft. Taxiing aircraft during unusually high winds will be avoided. They may be taxied at the discretion of the deployment commander when the action will lessen the possibility of aircraft damage.

12.9.2. Outside Parking. If possible, light aircraft will be parked inside hangars. Aircraft parked outside will be positioned face into the wind and tied down. Transient aircraft will be tied down as directed by the aircraft commander or applicable aircraft technical data.

12.9.3. High Winds. When wind velocity exceeds 30 knots (sustained or gusts), light aircraft in temporary docks or extending outside the hangars will be towed clear and parked in compliance with applicable aircraft technical data. When wind velocity exceeds 50 knots (sustained or gusts), medium or heavy aircraft in temporary docks or extending outside the hangars will be towed clear and then parked in compliance with applicable aircraft technical data.

12.9.4. Work Materials. All maintenance equipment, work stands, loose aircraft parts, and materials not in use will be removed from the parking area and stored in a safe area. Equipment remaining outside will be secured against wind movement.

12.9.5. Personnel. When winds reach hazardous velocities, activities other than those required to safeguard the aircraft will be avoided. Guidance for actions involving electrical storms is found in paragraph [4.2.](#)

12.10. Cold Weather-Related Injuries:

12.10.1. Chilblain:

12.10.1.1. Definition. A nonfreezing cold injury, which, while painful, causes little or no permanent impairment.

12.10.1.2. Symptoms. Appears as red, swollen skin, which is tender, hot to the touch, and may itch. This can worsen to an aching, prickly (“pins and needles”) sensation, and then numbness. It can develop in only a few hours to skin exposed to moist cold conditions.

12.10.1.3. First Aid. Prevent further exposure; remove wet, constrictive clothing; and wash and dry the injury gently. Elevate the injured area and warm by applying layers of loose warm clothing or blankets, (expect pain and blisters may develop). Do NOT pop blisters, apply lotions or creams, massage, expose to extreme heat, or allow victim to walk on the injury. Seek medical treatment.

12.10.2. Frostbite:

12.10.2.1. Definition. Frostbite is a severe reaction to cold exposure that can cause permanent damage. The combination of wind and cold temperatures attacking unprotected skin is the main cause of frostbite. When skin is exposed to the cold, blood vessels in the skin clamp down or constrict. As a result of a decreased blood flow to the skin, the fluid in and around skin cells develops ice crystals, which causes frostbite to occur. The areas most likely to get frostbitten are cheeks, ears, noses, fingers, toes and feet. The extent of injury caused by exposure depends on wind velocity, duration and type of exposure, temperature, and humidity. Wind chill (a calculation of the adjusted temperature because of air temperature and wind speed) can help determine the possibility of frostbite (see [Table 12.1](#)).

12.10.2.2. Symptoms. Just before frostbite occurs, the affected skin may be slightly flushed. As frostbite develops, the skin appearance changes to white or grayish-yellow. Pain is sometimes felt early but subsides later (often no pain is felt.) The affected area feels intensely cold and numb. The victim frequently is not aware of frostbite until someone points out the change in skin color or the victim sees the skin changes and feels the pain of frostbite once indoors, away from cold exposure.

12.10.2.3. First Aid. Prevent further exposure; remove wet, constrictive clothing. Rewarm gradually by direct skin-to-skin contact between injured area and noninjured skin of the victim or a buddy. Evacuate for medical treatment (foot injuries by litter.) Do not allow the injury to refreeze during evacuation. **NOTE:** Do not rewarm a frostbite injury if it could refreeze during evacuation; do not rewarm frostbitten feet if the victim must walk for medical treatment; and do NOT rewarm injury over an open flame.

12.10.3. Trenchfoot:

12.10.3.1. Definition. Trenchfoot is a very serious nonfreezing cold injury which develops when skin of the feet is exposed to moisture and cold for prolonged periods (12 hours or longer). The combination of cold and moisture softens skin, causing tissue loss and, often, infection. Untreated, trenchfoot can eventually require amputation. The risk of this potentially crippling injury is high during wet weather or when troops are deployed in wet areas. Personnel wearing rubberized or tight-fitting boots are at risk for trenchfoot regardless of weather conditions, since sweat accumulates inside these boots and keeps the feet wet.

12.10.3.2. Symptoms. Often, the first sign of trenchfoot is itching, numbness, or tingling pain. Later the feet may appear swollen, and the skin mildly red, blue, or black. Commonly, trenchfoot shows a distinct "water-line" coinciding with the water level in the boot. Red or bluish blotches appear on the skin, sometimes with open weeping or bleeding.

12.10.3.3. First Aid. Prevent further exposure; remove wet, constrictive clothing; wash and dry injury gently. Elevate injury, cover with layers of loose, warm clothing, and allow to rewarm (pain and blisters may develop.) Do not pop blisters, apply lotions or creams, massage, expose to extreme heat, or allow victim to walk on injury. Refer for medical treatment.

Table 12.1. Wind-Chill Chart.

WIND SPEED	COOLING POWER OF WIND EXPRESSED AS "EQUIVALENT CHILL TEMPERATURE"																
	TEMPERATURE (DEGREES FAHRENHEIT)																
MPH	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
CALM	EQUIVALENT CHILL TEMPERATURE																
5	35	30	25	20	15	10	5	0	-0	-10	-15	-20	-25	-30	-35	-40	-45
10	30	20	15	10	5	0	-10	-15	-20	-25	-35	-40	-45	-50	-60	-65	-70
15	25	15	10	0	-5	-10	-20	-25	-30	-40	-45	-50	-60	-65	-70	-80	-85
20	20	10	5	0	-10	-15	-25	-30	-35	-45	-50	-60	-65	-75	-80	-85	-95
25	15	10	0	-5	-15	-20	-30	-35	-45	-50	-60	-65	-75	-80	-90	-95	-105
30	10	5	0	-10	-20	-25	-30	-40	-50	-55	-65	-70	-80	-85	-95	-100	-110
35	10	5	-5	-10	-20	-30	-35	-40	-50	-60	-65	-75	-80	-90	-100	-105	-115
40	10	0	-5	-15	-20	-30	-35	-45	-55	-60	-70	-75	-85	-95	-100	-110	-115
WINDS ABOVE 40 HAVE LITTLE ADDITIONAL EFFECT	LITTLE DANGER (Normal Numbers)					INCREASING DANGER FLESH MAY FREEZE WITHIN 1 MINUTE (Bolded Numbers)					GREAT DANGER FLESH MAY FREEZE WITHIN 30 SECONDS (Italic Numbers)						

12.10.4. Hypothermia:

12.10.4.1. Definition. A condition brought on when the body cannot produce heat as fast as it is being lost. Hypothermia is a life-threatening condition in which deep-body temperature falls below 95 degrees F. Many people do not understand how dangerous hypothermia is or how fast it can set in. When your body starts losing heat faster than it can produce it, exposure has started. If exposure continues long enough, it leads to hypothermia.

12.10.4.1.1. Wet skin and wind accelerate body heat loss and the body produces less heat during inactive periods. Body temperature can fall even when air temperatures are above freezing, if conditions are windy, clothing is wet, and the individual is inactive.

12.10.4.1.2. Victims normally do not notice the signs of hypothermia in themselves. Therefore, it's up to other members to be alert for symptoms. Even mild hypothermia can cause victims to make poor decisions or act intoxicated (removing clothing when it is clearly inappropriate, trying to start a fire in the rain, etc.).

12.10.4.2. Symptoms. Symptoms can include a puffy face, uncontrollable shivering, mental confusion and slow or slurred speech, memory lapses, incoherence, frequent stumbling, slow breathing, slow heart, drowsiness, exhaustion, withdrawn or bizarre behavior, irritability, and the abdominal area is cold to touch.

12.10.4.3. First Aid. A person showing these symptoms needs immediate treatment. If a person is alert and shivering, they probably are only suffering from mild hypothermia. They may deny there is a problem, but someone needs to take control and do the following (**NOTE:** If shivering has stopped, or the person is unconscious, severe hypothermia is probably present and the person requires immediate emergency medical intervention): Prevent further exposure (wind, rain, or cold); remove wet clothing and replace with warm dry clothes. Warm victims by covering them with blankets, sleeping bags, etc., body-to-body contact can also provide warmth. Do not let the

victim sleep; initiate Cardiopulmonary Resuscitation (CPR), only if required. Sometimes the heart beat and breathing of hypothermia victims is so faint it can go undetected, victims may also show no response to touch or pain. Handle gently during treatment and evacuation, because rough handling can cause life-threatening disruptions in heart rate. Get medical attention as soon as possible.

12.10.5. Prevention of Cold-Related Injuries. Following are suggestions for preventing cold-related injuries (chilblain, frostbite, and hypothermia):

12.10.5.1. If possible, limit the duration of exposure to extreme cold.

12.10.5.2. Always wear proper protective clothing, which may include an extra wool or insulated socks, warm boots, and wind- and water-repellent outer-gear. Wear mittens instead of gloves. Wear head and face covering to retain heat (as much as 70 percent or more of the body's heat can be lost through radiation and convection from an uncovered head).

12.10.5.3. Wear several layers of clothing, rather than one or two "bulky" layers. Air is trapped between these layers and acts as insulation against the cold. Clothing filled with wool, down, and synthetic foams may assist in the retention of body heat.

12.10.5.4. Drink warm liquids like soup.

12.10.5.5. Eat nutritious, high-energy foods. Eat at least one hot meal a day. Exercise regularly to stimulate heat production in your muscles.

12.10.5.6. Avoid:

12.10.5.6.1. Caffeine and tobacco use, as these leave the skin more prone to thermal injury (caffeine may contribute to heat loss and smoking slows down blood circulation to the extremities).

12.10.5.6.2. Taking medication (some combinations of drugs can lower the body's resistance to the cold). Seek professional medical advice when taking medications.

12.10.5.6.3. Alcohol use, because it increases heat loss and distorts the senses, including the sense of how much time has been spent in the cold. Drinking alcohol lowers the body's temperature and dulls awareness to the cold. The person consuming the alcohol may perceive they are warmer, while in reality they may be contributing to greater cold injury.

12.10.5.6.4. Wet clothing, shoes, or socks, as they may further contribute to loss of body heat. Try to change wet footwear and clothing as soon as practically possible.

12.11. Cold Weather-Related Personal Protection. Often personnel focus on *recognizing* and *treating* cold-weather injuries rather than *preventing* them. Consequently, the first-line supervisor will ensure the following actions are taken to prevent cold-related injuries:

12.11.1. Check personnel for proper dress (gloves, head protection, loose, layered clothing).

12.11.2. Ensure personnel properly remove layers of clothing as the temperature changes.

12.11.3. Never allow personnel to unnecessarily wear wet clothing.

12.11.4. Require personnel to change socks regularly.

12.11.5. Identify and closely monitor personnel who have previously suffered a cold-weather injury, as they are more susceptible.

- 12.11.6. Ensure personnel practice proper hygiene.
- 12.11.7. Do not allow personnel to sleep in confined areas with vehicle-engines running.
 - 12.11.7.1. Brief personnel on the symptoms of carbon-monoxide poisoning.
- 12.11.8. Ensure personnel are aware of hypothermia hazards.
- 12.11.9. Make sure personnel know that alcohol gives a “sensation” of warmth, but it increases loss of body heat.
- 12.11.10. Consistent with mission accomplishment, keep personnel’s duration and exposure to cold to a minimum.
- 12.11.11. Ensure personnel know exposure to freezing temperatures with foot perspiration may cause frostbite.
- 12.11.12. Require that personnel wear non slip footwear (insulated if necessary) for wet, snowy, or icy surfaces.
- 12.11.13. Make sure provisions are in place to warn personnel of adverse weather.
- 12.11.14. Encourage use of the “buddy system” to help detect signs of cold related injury and illness in others.
- 12.11.15. Personnel should wear dry socks and footwear. Socks should be changed at least daily. Standing for long periods in cold water should be avoided.

12.12. Heat Stress Disorders and Prevention. Heat stress is the combination of environment and physical work factors that constitute the total heat load imposed on the body. The environmental heat stress factors are air temperature, radiant heat exchange (example, sunlight), air movement, and relative humidity. Physical work contributes to total heat stress through the body's production of heat (metabolic heat) as it burns energy to sustain the work. This production of metabolic heat depends on the intensity of the physical effort that is affected, in turn, by body size, muscular development, physical fitness, and age. As environmental temperatures approach normal skin temperature, cooling of the body becomes more difficult. These conditions adversely affect an individual’s ability to work in a hot environment, especially when conditions of high humidity exist. Personnel who must perform delicate or detailed work may find their accuracy suffering, and others may find that their ability to comprehend and retain information decreases. As a result, certain safety problems are common to hot environments—slipperiness of sweaty palms, dizziness, or the fogging of safety glasses. If there are hot metal surfaces or steam, the possibility of burns also exists. Increased body temperature and physical discomfort promote irritability, anger, and other emotional states, which can cause workers to overlook safety procedures or divert their attention from hazardous tasks.

- 12.12.1. Heat Stress Disorders. Heat stress disorders or heat disorders are general terms used to indicate any type of adverse health problem related to heat. Heat syncope, cramps, exhaustion, and stroke are all forms of heat stress disorders. Heat disorders may be recognized by one or more of the following symptoms: nausea, vomiting, fever, dizziness, headache, faintness, abnormal sweating, convulsions, lack of coordination, mental confusion, and abdominal or leg cramps. The personnel most likely to be affected by the heat are those who have just arrived from cooler regions of the country, are obese, or are in poor condition. A list of heat stress disorders follows:

12.12.1.1. Heat Cramps. These are painful intermittent spasms of the muscles used during work (arms, legs, or abdominal) that may occur during or after work hours. Cramps may result from exposure to high temperature for a relatively long time, particularly if accompanied by hard physical work. Cramps usually occur in unacclimatized personnel after heavy sweating and are the result of excessive loss of salt from the body. Even if the moisture is replaced by drinking water, the loss of salt by sweating may provoke heat cramps.

12.12.1.2. Heat Exhaustion. The signs of heat exhaustion are profuse sweating, weakness, rapid pulse, dizziness, nausea, and headache. The body temperature is elevated with heat exhaustion, although not to the same degree as with heat stroke. Heat exhaustion is caused by a deficiency of water and (or) salt intake and circulatory strain from competing demands for blood flow to the skin and to active muscles. Heat exhaustion can rapidly progress to heat stroke if not treated immediately.

12.12.1.3. Heat Stroke. Heat stroke is a medical emergency and is caused by exposure to a hot environment in which the body is unable to cool itself sufficiently. This results in the body temperature rising rapidly. With classic heat stroke, hot dry skin may be present. This should be anticipated in older or debilitated individuals. With exertional heat stroke, sweating continues. It is often preceded by nausea or vomiting, abnormal shivering, and (or) confused mental status with slurred speech. In highly motivated individuals, the only sign before collapse and unconsciousness may be heavy sweating. Increased body temperature, if uncontrolled, may lead to delirium, convulsions, coma, and even death. Heat stroke is a much more serious condition than either heat cramps or heat exhaustion.

12.12.1.4. Heat Syncope. This is the fainting that occurs immediately after exertion without proper cool down or while standing erect and immobile in heat. Caused by pooling of the blood in dilated vessels and the lower parts of the body.

12.12.1.5. Hyponatremia (Acute Water Intoxication). This is a condition in which the level of sodium in the blood is markedly lowered as a result of sodium lost in sweat, coupled with fluid replacement using only large volumes of plain water (greater than 1 1/2 quarts per hour). This is a medical emergency. Hyponatremia is a life-threatening condition that may result in confusion, fatigue, muscle cramps, and nausea early on, followed later by vomiting, unconsciousness, seizures, and death if not recognized and treated promptly. This condition is difficult to distinguish from heat exhaustion and heat stroke, and if suspected should be treated immediately in a medical facility.

12.12.2. Heat Stress and Water Intoxication Warning Signs and Symptoms. Brief supervisors and workers on the signs and symptoms of heat stress disorders and how to minimize the effects of heat stress during operations, training exercises, and when personnel wear the ground crew chemical defense ensemble or other similarly impermeable clothing. Consult with aerospace physiology or bioenvironmental engineering for additional assistance, if needed.

12.12.2.1. Early Signs and Symptoms Actions:

12.12.2.1.1. Early signs include dizziness, headache, dry mouth, unsteady walk, weakness, and muscle cramps. Personnel displaying these symptoms should be removed from operations or training, allowed to rest in shade and given sips of water. If signs or symptoms do not improve in 15 to 30 minutes, transport to a medical facility. If signs or symptoms worsen, call for an ambulance.

12.12.2.2. Later Signs and Symptoms Immediate Actions:

12.12.2.2.1. The following symptoms may indicate advanced signs of heat stress disorders: Hot body, high temperature; confusion, unresponsiveness, coma; vomiting; involuntary bowel movement; convulsions, a weak or rapid pulse. If personnel display such symptoms call an ambulance for immediate transport to a hospital, lay the person down in shade with their feet elevated until the ambulance arrives. Give *sips* of water while waiting for the ambulance. Begin active cooling, if skin is hot to touch by undressing the victim as much as possible, pouring cool water on them, and fanning them.

12.12.3. Acclimatization. Personnel should be acclimated to heat exposures. Employees who are acclimatized to heat can work better. Acclimatization is a period of adjustment an individual's body requires to become accustomed to working in hot environments. Full acclimatization occurs through progressive degrees of heat exposure and physical exertion. Personnel may need 2 weeks of increasing exposures to become substantially acclimated and may retain most of their adaptation for about 1 week after leaving a hot climate. Personnel in good physical condition acclimatize more quickly. For personnel needing acclimatization, supervisors should adjust work schedules to provide progressive exposure to heat.

12.12.3.1. The human body is comfortable at about 75 degrees F with 45 percent relative humidity. Comfort is determined by the amount of activity, the relative humidity, and the amount of air movement—all variables that affect the rate at which the body loses heat. It takes 1 to 2 weeks for a person's body to adjust to a region's humidity and extreme heat.

12.12.3.2. Sweating can also maintain a stable body temperature if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced. An individual who is heat acclimated may perspire almost twice as much as an unacclimated individual. One of the effects of acclimatization is to allow an individual to begin perspiration earlier in the course of exercise; this allows for a quick, effective, and efficient beginning to heat dissipation and alleviation of early heat buildup. When the body cannot release heat, it stores it. This raises the core temperature and heart rate putting health at risk.

12.12.4. Sunburn. Sunburn can be a painful skin condition, which occurs as a result of overexposure to the ultraviolet rays of the sun. Sunburn affects the body's ability to cool itself and causes a loss of body fluids. It also causes pain and damages the skin. Ultraviolet (UV) rays react with a chemical called melanin that's found in most people's skin; the darker the skin color, the more melanin the skin contains to protect itself. Fair skinned personnel face an increased risk from sunburn. Sunburn develops when the amount of ultraviolet exposure exceeds what the skin can protect against. Even on cloudy, cool, or overcast days, UV rays travel through the clouds and reflect off materials, such as sand, water, snow, and concrete. This "invisible sun" can cause unexpected sunburn and skin damage.

12.12.4.1. Symptoms include: Red skin that's warm to touch; skin may be blistered or swollen (blistering may occur several days after exposure. Severe reactions (sometimes called "sun poisoning") may include fever, chills, nausea, or rash; and sunburned skin may peel several days after the sunburn.

12.12.4.2. First Aid: Apply cold compresses or immerse the sunburned area in cool water (baking soda in the water may help relieve the pain); apply a soothing moisturizing lotion to affected areas; take aspirin, acetaminophen, or ibuprofen to relieve pain, headache, and to reduce fever. Use an over-the-counter topical steroid cream if the pain persists. Drink plenty of water to replace fluid

loss. Do NOT apply petroleum jelly, ointment or butter (they make the symptoms worse and do not allow air to assist in healing). Avoid using local anesthetic creams or sprays, they may cause allergic reactions in some persons. Do NOT break blisters or wash burned skin with harsh soap.

12.12.4.3. Prevention. Sun radiation is very intense when the sun is highest overhead and is, therefore, the strongest. UV rays are strongest during summer months. When traveling to a distant location during the summer season, strong sun protection is important. Locations near the equator and at high altitudes require additional protection, because the air and cloud cover are thinner, allowing more damaging rays to get through the atmosphere.

12.12.4.3.1. Use sunscreen with a sun protective factor (SPF) of 30 or higher; lighter skin may require a higher SPF. Sunscreens rated higher than 15 SPF are usually less soluble and last longer. Apply sunscreen 30 minutes before going outdoors and reapply according to package directions. Give special attention to face, nose, ears, and shoulders. **CAUTION:** Some sunscreens cause eye pain and temporary blindness if they contact the eyes (usually when sweat mixed with sunscreen runs into the eyes.) Sunscreens that do not sting the eyes are available.

12.12.4.3.2. Use a lip balm with sunscreen. Use a lip balm with a SPF.

12.12.4.3.3. Wear clothing and a hat that covers the body and face. The hat, if possible, should completely shadow the face.

12.12.4.3.4. Wear sunglasses with UV protection whenever possible.

12.12.4.3.5. Be aware that some medications increase the skin's sensitivity to UV rays. Ask medical personnel if this is the case when given medications as a result of travel to certain locations. Antibiotics, antihistamines, nonsteroidal anti-inflammatory agents, tranquilizers, diuretics, and antidepressants are among the medications that can increase sun sensitivity.

12.12.5. Wet Bulb Globe Temperature (WBGT) Index. The WBGT index is used to measure the potential for heat stress injury. The WBGT index is a combination of temperature measurements, which considers dry air temperature, wind speed, relative humidity, and radiant heating. The heat index usually mentioned in weather forecasts is the "effective temperature" which only factors temperature and relative humidity. The effective temperature does not adequately account for environmental factors or human physiological responses.

12.12.5.1. WBGT Index Stages and Flags. Activity levels to prevent heat stress injuries can be tied to five stages of generally accepted WBGT index ranges. See [Table 12.2](#). for these stages.

12.12.6. Preventing Heat Stress Disorders in Training Environments. Use of the activity level restrictions in [Table 12.2](#). is recommended when planning or conducting outdoor training or movements. Personnel should be considered unacclimatized unless exposed to increasing levels of exertion in WBGT heat conditions.

12.12.7. Preventing Heat Stress Disorders in Occupational (Nontraining) Environments. Use of the activity level restrictions in [Table 12.3](#). is recommended when planning work and rest cycles for personnel who routinely perform their jobs while exposed to hot environments. The WBGT values listed in the table are screening values for the particular work rate indicated. These values are extracted from the American Conference of Governmental Industrial Hygienists threshold limit values handbook. **NOTE:** The heat category and flag color from [Table 12.2](#). do not apply to occupationally exposed workers.

Table 12.2. Training Requirements for Hot Environments. (note 1)

LINE	A	B	C		D		E	
	Heat Category (Flag Color)	Temperature Range WBGT (°F) (notes 2, 3)	Easy Work (100 - 335 Watts)		Moderate Work (335 - 500 Watts)		Hard Work (500 - 700 Watts)	
			Work/ Rest (note 4)	Water Intake Qt/hr (note 5)	Work/ Rest (note 4)	Water Intake Qt/hr (note 5)	Work/ Rest (note 4)	Water Intake Qt/hr (note 5)
1	1 (White)	78 - 81.9	No limit	1/2	No limit	3/4	40/20	3/4
2	2 (Green)	82 - 84.9	No limit	1/2	50/10 min	3/4	30/30	1
3	3 (Yellow)	85 - 87.9	No limit	3/4	40/20 min	3/4	30/30	1
4	4 (Red)	88 - 89.9	No limit	3/4	30/30 min	3/4	20/40	1
5	5 (Black)	> 90	50/10 min	1	20/40 min	1	10/50 min	1

NOTES:

1. These values will sustain performance and hydration for at least 4 hours of work in the specified heat category. (Values are based on US Army Research Institute for Environmental Medicine recommendations; US Army policy.)
2. Wearing body armor adds 5 o F to measured WBGT.
3. When performing activities with ground crew ensemble, fire-fighting gear, or other restrictive or impermeable clothing, make arrangements for remote site measurement of the WBGT and add 10 degrees F to the measurement (add 15 degrees F if also wearing body armor). These adjustments account for the clothing and equipment effects on evaporative cooling (increased barrier) and any increase in work due to the additional load.
4. Rest means minimal physical activity (sitting or standing) accomplished in the shade if possible (but not necessary).
5. Individual water need will vary +/- 1/4 quart per hour.

CAUTION: Hourly fluid intake should not exceed 1 1/2 quarts; daily fluid intake should not exceed 12 quarts. Rapid ingestion of large amounts of water (greater than 1 1/2 quarts per hour) may lead to hyponatremia (acute water intoxication), which is a life-threatening condition that may lead to weakness, convulsions, loss of consciousness, and death if not recognized and treated promptly.

Table 12.3. Permissible Heat Exposure Limits. (note)

LINE	A	B	C	D	E	F	G	H	I
	Work Demands	Acclimatized				Unacclimatized			
		Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
1	100% work	85	81.5	79		81.5	77	72.5	
2	75% work; 25% rest	87	83.5	81.5		84	79	76	
3	50% work; 50% rest	89	85	83.5	81.5	86	82.5	80	77
4	25% work; 75% rest	90	88	86	85	88	84	82.5	80

NOTE: Values given in °F WBGT.

12.13. Hot Weather Solutions:

12.13.1. Fluid Replenishment and Salt. People often don't replenish the 2-3 gallons of liquid they sweat daily and "thirst" is not an adequate indication to signal fluid intake. Therefore, supervisors must implement and enforce policies to ensure personnel drink the recommended amount of fluid, even if they are not thirsty. The amount of fluid replacement depends upon the activity, temperature, and how much sweat is generated. Medical personnel can advise how much replacement liquid is required, as well as what type of liquids are recommended (normally, non-carbonated beverages and water). Personnel should avoid alcoholic and beverages with caffeine; they affect the body's circulatory function and may increase urination and the tendency for dehydration. Drinking highly sweetened beverages is also not recommended. Liquids should be sipped, not gulped and it is better to drink small amounts of water frequently than to drink large amounts occasionally. Some salt is lost in the sweat. Because the typical North American diet contains so much salt, an individual should season food to taste but should not make any additional attempts to add excessive salt to the diet. Salt tablets shall not be used except under special operating environments when ordered by competent medical authority. In addition, supervisors must ensure individuals with medical conditions requiring a low-sodium diet are provided with appropriate liquids.

12.13.2. Adequate Food Intake. Failure to consume sufficient food energy can increase the risk of dehydration and heat injury and illness. Causes of inadequate food intake are: decreased appetite, poor ration palatability, menu boredom, inability to work on a full stomach, lack of water, lack of specific meal periods, lack of time to prepare meals, anxiety due to field conditions, and intentional dieting. In hot weather, the amount of calories required actually increases slightly although the desire to eat goes down. Appetite suppression is a more serious problem in individuals who are not heat acclimatized.

12.13.2.1. Personnel living and working in temperatures ranging from 86 to 104 degrees °F may require up to 10 percent more calories to do the same amount of work as they would under more temperate conditions. Inadequate food intake results in body weight loss, which can eventually

impair physical and mental performance. Poor food intake decreases the intake of salt necessary to retain water.

12.13.2.2. Individuals consume almost half of all fluids at mealtimes. When personnel skip meals or voluntarily limit their food intake, then the amount of fluids consumed may also decrease.

12.13.2.3. Encourage personnel to eat at least two balanced meals per day.

12.13.3. Clothing. Whenever possible, personnel should wear the appropriate weight uniform and a hat. If possible, wear loose fitting clothing, especially at the neck and wrist, to allow air circulation. Senior leadership may want to consider alternative uniform policies, such as allowing workers to unblouse trouser cuffs on the battle dress uniform and authorize wear of “floppy” type or soft brimmed head gear to minimize the effects of hot weather environments.

12.13.3.1. Guidelines For Wear Of The Chemical Defense Ensemble. Personnel performing ground crew operations and training while wearing the charcoal impregnated overgarment and associated protective equipment of the chemical defense ensemble are at increased risk of injury from heat stress. Maximum work times tolerated by personnel while they are wearing the protective ensemble are affected by factors such as an individual's physical condition, state of thermal acclimatization, and degree of hydration; the workload associated with a given task; and environmental factors including air velocity, radiant heat (for example, sunlight), air temperature, and humidity. WBGT criteria incorporate many of these variables. While WBGT criteria aid in advising commanders concerning the impact of the ensemble under actual operating conditions, they are not readily usable by line supervisors when conducting small unit training exercises.

12.13.3.2. Minimization of Heat Casualties. Measures to minimize heat casualties in personnel while they are accomplishing their mission are discussed in AFMAN 32-4005, *Personnel Protection and Attack Actions*. Estimates of increases in task performance times, "maximum" and "safe" work times, and recovery rest times, while personnel are wearing mission-oriented protective postures (MOPP) 4 equipment, are in AFMAN 32-4005. Commanders and supervisors should consult this guidance when planning and conducting operations to avoid heat injuries in their personnel.

12.13.4. Cool Rest Areas. In very hot situations, cool rest areas should be provided for personnel.

12.13.5. Rest Breaks. Integrate rest breaks in to the work schedule. Work-rest cycles provide the opportunity for a body to dissipate excess heat, slow down the production of internal heat, and provide greater blood flow to the skin. Short, but frequent rest breaks are recommended in hot environments. Use intermittent rest periods with water breaks. Ideally, the workload should be distributed evenly over the course of the day.

12.13.6. The “Buddy System.” Use of the “buddy system” to help detect signs of dehydration and illness in others is highly encouraged.

12.13.7. Other Administrative Controls:

12.13.7.1. Reduce the physical demands of work when possible (use mechanical assistance for excessive or heavy lifting or digging);

12.13.7.2. Whenever possible, use shifts, such as early morning, cool part of the day, or night work;

12.13.7.3. Use relief workers and pace the work; and

12.13.7.4. Limit worker occupancy, or the number of workers present, especially in enclosed areas.

Chapter 13

NATURAL DISASTERS

13.1. Introduction. Each year natural disasters affect the lives of thousands of people. Within minutes, a natural disaster can devastate an entire area, and change people's lives forever. People who understand disasters and know what to do beforehand and after a disaster hits can significantly reduce disaster deaths and damage. Preparedness is crucial. Each unit should pre-plan for a disaster. During the first few hours or in some cases, the days following a disaster, essential services may be limited or unavailable. People must be prepared and ready to react to a number of severe natural disaster scenarios.

13.2. Flash Floods:

13.2.1. Flash flood waves, moving at incredible speed, can roll boulders, tear out trees, destroy buildings and bridges, and scour out new channels. It is possible for deadly walls of water to suddenly become destructive floods and rush through an area without warning.

13.2.2. When a flash flood warning is issued for an area or it's suspected that a flash flood is imminent, act quickly. Every second counts!

13.2.2.1. Go to high ground immediately.

13.2.2.2. Avoid areas subject to flooding such as, dips, low spots, canyons, gullies, culverts, and washes.

13.2.2.3. Do not attempt to cross a swollen stream on foot. Do not attempt to drive through flooded areas. Shallow, swiftly flowing water can wash a vehicle from a roadway. Also, the roadbed under the water may not be intact.

13.2.2.4. If a vehicle stalls in a stream or flooded area abandon it immediately and seek higher ground—rapidly rising water may engulf the vehicle and sweep it away.

13.3. Sand and Dust Storms:

13.3.1. A sand or dust storm usually arrives suddenly in the form of an advancing wall of sand or dust and debris which may be miles long and several thousand feet high. These storms can strike with little warning, making driving conditions hazardous. Blinding, choking sand or dust can quickly reduce visibility, causing traffic mishaps that may involve chain collisions, creating massive pileups. Dust storms usually last only a few minutes, but the actions a motorist takes during the storm are important.

13.3.2. Sand and dust storm safety tips follow:

13.3.2.1. If dense sand or dust is observed blowing across or approaching a roadway, pull the vehicle off the pavement as far as possible, stop, turn off lights, set the emergency brake, and take your foot off the brake pedal to be sure the tail lights are not illuminated. **NOTE:** In the past, motorists driving in sand and dust storms have pulled off the roadway, leaving lights on. Vehicles approaching from the rear and using the advance car's lights as a guide have inadvertently left the roadway and in some instances collided with the parked vehicle. Make sure all lights are off when departed from the roadway.

13.3.2.2. Don't enter the dust or sand storm area unless it's absolutely unavoidable.

13.3.2.3. If leaving the roadway is not possible, proceed at a speed suitable for visibility, turn on the vehicle lights, and occasionally sound the horn. If visible, use the painted centerline as a guide. Look for a safe place to pull off the roadway.

13.3.2.4. Never stop on the traveled portion of the roadway.

13.3.2.5. A dust or sand storm warning means visibility of 1/2 mile or less due to blowing dust or sand, and wind speeds of 30 miles an hour or more.

13.4. Tornadoes:

13.4.1. A *tornado watch* means conditions for tornado development are favorable. A *tornado warning* means a tornado has been sighted on the ground.

13.4.2. If a *tornado warning* is issued for an area or whenever a tornado threatens:

13.4.2.1. Stay away from windows, doors, and outside walls. Don't open the windows.

13.4.2.2. Go to a basement or shelter if available or to an interior room on the lowest floor, such as a closet or bathroom. Crouch down and cover your head.

13.4.2.3. Exit vehicles immediately and go to a substantial structure or designated tornado shelter. If no suitable structure is nearby, lie flat in the nearest ditch, ravine, culvert, or other depression and use your hands to cover your head.

13.4.2.4. Leave as soon as tornado danger has passed to avoid swollen stream waters that often accompany thunderstorms.

13.4.2.5. Remember—if you see a tornado and it looks like it is not moving, it might be heading straight at you.

13.5. Hurricanes. A hurricane causes sea level to rise above normal tidal heights, with giant wind-driven waves and strong, unpredictable currents. Tornadoes spawned by hurricanes are extremely dangerous.

13.5.1. *Hurricane Watch*—Hurricane conditions pose a possible threat to an area, usually within 36 hours. In some especially vulnerable areas, early evacuation may be necessary when a Watch is issued.

13.5.2. *Hurricane Warning*—Hurricane conditions are expected in an area within 24 hours. Areas subject to storm surge or tides should be evacuated as well as areas which could be isolated by flood waters.

13.5.3. When your area receives a hurricane warning:

13.5.3.1. Leave low-lying areas.

13.5.3.2. Protect windows with boards, shutters, or tape.

13.5.3.3. Secure outdoor objects or bring them inside.

13.5.3.4. Ensure vehicles are fully fueled.

13.5.3.5. Save several days' water supply.

13.5.3.6. Stock up on canned and other nonperishable food items.

13.5.3.7. Check radio and flashlight for good batteries. (Keep an additional supply of batteries on-hand.)

13.5.3.8. Adjust refrigerator controls to maximum cold settings and don't open unless necessary.

13.5.3.9. Use the phone only for emergencies.

13.5.3.10. Stay inside on the downwind side if the building is sturdy and on high ground, or in the center of the building, in a closet, or bathroom without windows. In all cases, stay away from windows.

13.5.4. If it becomes necessary to leave, shut off water and electricity at main connections.

13.5.5. Be alert for tornadoes, which can happen before, during, and after a hurricane passes over.

13.5.6. Stay away from floodwaters.

13.5.7. Be aware of the calm "eye;" the storm is not over. The worst part of the storm will follow once the eye passes over and the winds come from the opposite direction. Trees, shrubs, buildings, and other objects damaged by the first winds can be broken or destroyed by the second winds whose force is opposite the first winds.

13.6. Tsunami Safety:

13.6.1. The phenomenon called "tsunami" (soo-NAH-mee) is a series of traveling ocean waves of extremely long length generated by disturbances associated primarily with earthquakes occurring below or near the ocean floor. Underwater volcanic eruptions and landslides can also generate tsunamis.

13.6.1.1. Tsunamis that strike a coastal location in the Pacific Ocean Basin are most always caused by earthquakes.

13.6.1.2. Tsunamis can be very large. In coastal areas their height can be as great as 30 feet or more (100 feet in extreme cases), and they can move inland several hundred feet.

13.6.1.3. All low lying coastal areas can be struck by tsunamis.

13.6.1.4. A tsunami consists of a series of waves. Often the first wave may not be the largest. The danger from a tsunami can last for several hours after the arrival of the first wave.

13.6.1.5. Tsunamis can move faster than a person can run and can crush homes and other coastal structures.

13.6.1.6. A tsunami will cause the water near shore to recede, exposing the ocean floor.

13.6.1.7. The force of some tsunamis is enormous. Large rocks weighing several tons, along with boats and other debris, can be moved inland hundreds of feet by the tsunami wave activity.

13.6.1.8. Tsunamis can occur at any time, day or night.

13.6.1.9. Tsunamis can travel up rivers and streams that lead to the ocean.

13.6.1.10. Offshore reefs and shallow areas may help break the force of tsunami waves, but large and dangerous waves can still be a threat to coastal residents in these areas.

13.6.2. What to do during a tsunami:

13.6.2.1. If in a tsunami evacuation zone, evacuate to the evacuation site.

13.6.2.2. If at the beach or near the ocean and the earth shakes, move immediately to higher ground. DO NOT wait for a tsunami warning to be announced. (A regional tsunami from a local earthquake could strike some areas before a tsunami warning could be announced.) Stay away from rivers and streams that lead to the ocean.

13.6.2.3. Tsunamis generated in distant locations will generally give people enough time to move to higher ground. Small buildings located in low-lying coastal areas are not designed to withstand tsunami impacts. Do not stay in these structures if a tsunami warning is issued.

13.7. Earthquakes:

13.7.1. An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface.

13.7.1.1. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis).

13.7.1.2. Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured buildings not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake.

13.7.1.3. Earthquakes can occur at any time of the year.

13.7.1.4. The actual movement of the ground in an earthquake is seldom the direct cause of death or injury. Most casualties result from falling objects and debris because the shocks can shake, damage, or demolish buildings and other structures. Earthquakes may also trigger landslides and generate huge ocean waves (seismic sea waves), each of which can cause widespread injury, death, and destruction.

13.7.2. What to do when the shaking begins:

13.7.2.1. DROP, COVER, AND HOLD ON! Move only a few steps to a nearby safe place. Stay indoors until the shaking stops. Evacuate buildings and structures only after the shaking has stopped.

13.7.2.2. If inside a building, get under a sturdy piece of furniture like a desk or table and hold on to it. If the desk or table moves across the floor you will move with it and not be left unprotected. If there is nothing to get under, then get against an inside hallway or stand in a doorway.

13.7.2.3. Stay clear of windows and heavy furniture or appliances. Avoid areas where things may fall on you (storage areas, warehouses, etc.)

13.7.2.4. Do not run down stairs or rush outside while the building is shaking or while there is danger of falling and getting injured or being hit by falling glass or debris.

13.7.2.5. If outdoors, find a clear spot away from buildings, trees, power lines, or anything else that may fall. Drop to the ground.

13.7.2.6. If in a vehicle, drive away from bridges, underpasses, or overpasses. Carefully bring the vehicle to a stop in a safe area and set the parking brake. Stay in the vehicle until the shaking stops.

If a power line falls on the vehicle, stay inside until a trained person removes the wire. When driving is resumed, watch for breaks in the pavement, fallen rocks, and uneven and damaged traffic structures, such as bridges and underpasses.

13.7.2.7. Expect aftershocks. Each time one is felt, DROP, COVER, AND HOLD ON!

Chapter 14

PERSONNEL

14.1. Fatigue. Fatigue can cause mishaps. After 48 to 72 hours without sleep, personnel become ineffective. So, the best measure against fatigue is sleep. Water consumption, diet, physical conditioning, and personal hygiene all have an impact on fatigue. Ensure the impact is positive.

14.1.1. Symptoms of Fatigue. The symptoms manifest themselves in increased errors, difficulty in following instructions, lack of motivation, and carelessness. All this may translate into unnecessary risk-taking or shortcuts to get the job done—an open invitation for a mishap. Watch for the following symptoms of fatigue:

14.1.1.1. Headaches.

14.1.1.2. Poor physical hygiene.

14.1.1.3. Impatience and irritability.

14.1.1.4. Loss of appetite.

14.1.1.5. Inability to focus on task at hand.

14.1.1.6. Outright physical exhaustion.

14.1.1.7. Inability to make decisions.

14.1.2. Facts About Sleep Deprivation:

14.1.2.1. You cannot train to overcome sleep loss.

14.1.2.2. Tasks—even *critical tasks*—that are uninteresting and take a long time are extremely conducive to sleep.

14.1.2.3. Performance of mental tasks requiring calculations, creativity, and ability to plan ahead declines by 25 percent for every 24-hour period of semi-continuous work without sleep.

14.1.2.4. Leader's abilities can be degraded by sleep loss, impacting on quick and effective responses to changing battlefield conditions.

14.1.2.5. Tasks that have been well-learned and repeatedly practiced are more resistant to sleep-loss effects. Therefore, select the best trained to perform critical tasks.

14.1.2.6. The ability to learn *new* information is compromised by sleep loss.

14.1.2.7. Leadership ability cannot overcome sleep loss.

14.1.2.8. Sleep loss over time (greater than 2 days) has a cumulative effect.

14.1.3. Guidelines for Sleep Plans:

14.1.3.1. Six to eight hours' sleep will maintain mental task performance indefinitely.

14.1.3.2. Three to four hours' sleep daily will maintain mental task performance for 5 to 6 days.

14.1.3.3. Less than 4 hours' sleep daily over a 3- to 6-day period will impair effectiveness.

14.1.3.4. Best sleep periods, given limited choice, are 0300 to 0600 and 1600 to 1900.

14.1.3.5. Provide for a *minimum* of 4 to 5 hours' quality (uninterrupted) sleep; however, after 6 to 7 days, accumulated sleep loss will equate to performance of 48 hours without sleep.

14.1.3.6. Allow for naps as often as possible. Four 1-hour naps in a 24-hour period are as beneficial as 4 hours' sleep. However, accumulative sleep loss is more severe with fragmented sleep.

14.1.3.7. Sleep plans should include provisions to recover from sleep loss:

14.1.3.7.1. Twelve hours of sleep or rest (at least 8 to 10 hours' sleep) are required after 36 to 48 hours' acute sleep loss.

14.1.3.7.2. Twenty-four hours of sleep or rest (at least 15 hours' sleep) are required after 36 to 48 hours' sleep loss under conditions of high workload (12 to 16 hours per day). This is particularly important for commanders and staff with high mental task workloads.

14.1.3.7.3. Two to three days of sleep or rest are required after 72 to 96 hours' sleep loss. The sleep or rest period means 8 to 10 hours of sleep per day and light duty.

14.2. Personnel Checklist:

14.2.1. Are people actively involved in the buddy system on- and off-duty, on- and off-base?

14.2.2. Are people briefed to continuously scan to identify potential unsafe acts and conditions in order to prevent mishaps?

14.2.3. Do supervisors give periodic safety briefings?

14.2.4. Do people use team work for hazard identification and elimination?

14.2.5. Do people know how to use fire extinguishers?

14.2.6. Are people aware of carbon monoxide poisoning symptoms: headache, dizziness, nausea, vomiting, fainting, chest pain, rapid breathing, shortness of breath, confusion, reddish skin, unconsciousness, convulsions. Are people aware carbon monoxide poisoning can lead to death?

14.2.7. Are people aware of first aid for carbon monoxide poisoning: removal from exposure area to fresh air, loosen clothing, give CPR if not breathing, keep warm?

14.2.8. Are people billeted off-base in foreign countries aware that non-US construction and safety standards are often considerably less stringent than those in the US?

14.2.8.1. For example, it is not an uncommon practice, for hotels in third-world countries, to chain or lock doors leading outside that are intended for emergency egress in the event of fire or other unsafe condition. This can be a deadly practice!

14.2.9. Are people aware off-base establishments may be heated with kerosene or charcoal in an under-the-floor heating system? (Ventilate rooms to reduce possibility of carbon monoxide poisoning.)

14.2.10. Are personnel briefed on the increased number of personnel, aircraft, and vehicles on and off the base?

14.2.11. Do people exercise extreme caution when walking or jogging on the base at night? People should avoid jogging on the open roadway?

- 14.2.12. When personnel are jogging or walking, do they wear headphones only on running tracks, not when crossing streets or on the open highway?
- 14.2.13. Do people walk, jog, and run facing traffic?
- 14.2.14. Do bicyclists ride single file, with traffic? Do they wear properly secured bicycle helmets?
- 14.2.15. Are people aware there may be minimal outside lighting?
- 14.2.16. Do people carry a flashlight after dusk and before dawn and remain on established paths or walkways? Do they wear reflective items?
- 14.2.17. Do supervisors ensure gas is not used as a cleaning solvent or place flame-producing devices in the presence of flammable materials?
- 14.2.18. Are roof-top parties strictly forbidden?
- 14.2.19. Are people aware of the hazards of drinking and the potential of falling from balconies and out of windows?
- 14.2.20. Do people avoid sleeping in areas where vehicles might be moving off road?
- 14.2.21. Do people wear personal protective equipment when required or when it reduces the chance of injury?
- 14.2.22. Are base personnel aware of unusual hazards to the base populace due to possible airdrops and jumpers?

Chapter 15

SPOT INSPECTIONS

15.1. General. In this guide there are a number of applicable areas for conducting spot inspections. The Deployment Safety Officer and NCO should conduct spot inspections of operational and industrial activities and facilities on a daily basis. The inspection should be logged and maintained in a continuity book, and in the event that a problem is identified, follow-up inspections should be conducted and documented. Proper documentation may alleviate problems later.

15.2. Safety Inspections. Safety inspections serve to identify hazards and correct them before a mishap occurs. Detailed inspections are carefully planned, and when a hazard is identified and a corrective action is taken, the inspection serves its purpose. Inspection reports should identify the root causes of an observed hazard, not merely the symptoms, to enable corrective action to be applied to a more general area than just the place where the hazard was identified. Spot inspections serve the same purpose, but are more spontaneous, less structured, and serve to examine subject areas at random points in time. This tends to make spot inspections a good barometer of the unit's safety climate.

15.3. Pre-Inspection Requirements. Maintaining a close working relationship with unit personnel is essential for conducting an effective safety program, and all functional areas of safety must be involved. Conducting spot inspections provides an excellent opportunity for getting involved in unit activities. Before embarking on an inspection:

15.3.1. Review material applicable to the area to be inspected. Use applicable checklists, if available, during the inspection. Spot inspection checklists do not include every item that may be observed and are not necessarily referred to in a step-by-step fashion.

15.3.2. When arriving in the area, contact the area supervisor before starting the spot inspection.

15.3.3. Explain that it is a spot inspection, and if requested, provide any checklists used for the inspection.

15.4. Documentation. Use a log to document spot inspections, even if no hazards are discovered. Maintain this documentation in a continuity book to facilitate program management should a safety staff follow

15.5. Re-Inspections. Be sure to re-inspect the areas where hazards are found to ensure corrective actions are taken and remain effective.

15.6. Responsibilities. In general, all Air Force employees must:

15.6.1. Comply with all US Air Force, Occupational Safety and Health Administration (OSHA), and AFOSH standards.

15.6.2. Promptly report safety, fire, and health hazards to their supervisor and to a safety representative as soon as possible.

15.6.3. Promptly report occupational injuries and illnesses to supervisors.

15.6.4. Wear or use required protective clothing and equipment.

15.6.5. Take adequate care while doing assigned tasks.

Chapter 16

AFTER-ACTION REPORT

16.1. After-action reports should be completed after any deployment or contingency operation. Information in after-action reports can be used during other operations and can be shared with representatives of other organizations who will be involved in a similar operation or an operation that takes place in the same locality.

16.2. Suggest an after-action report contain, as a minimum, the following items. Each organization can include additional material, as required.

- 16.2.1. Synopsis of deficiencies noted during inspections (categorize)?
- 16.2.2. What didn't work?
- 16.2.3. Successes (what worked)?
- 16.2.4. Priority items (what to do right away)?

TIMOTHY A. PEPPE, Major General, USAF
Chief of Safety

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

Air Force Policy Directive (AFPD) 91-2, *Safety Programs*

Air Force Pamphlet (AFPAM) 10-219, *Volume 5, Bare Base Conceptual Planning Guide.*

Air Force Handout (AFH) 10-222, *Volume 1, Guide To Bare Base Development.*

AFH 32-1084, *Facility Requirements.*

AFH 10-222, *Volume 2, Guide To Bare Base Assets.*

Air Force Instruction (AFI) 23-201, *Fuels Management.*

AFI 32-1065, *Grounding Systems.*

AFI 90-901, *Operational Risk Management.*

AFPAM 90-902, *Operational Risk Management (ORM) Guidelines and Tools.*

AFI 91-202, *The US Air Force Mishap Prevention Program.*

AFI 91-204, *Safety Investigations and Reports.*

AFI 91-207, *The US Air Force Traffic Safety Program.*

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program.*

AFI 91-302, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Standards.*

Air Force Joint Manual (AFJMAN) 24-204, *Preparing Hazardous Materials for Military Air Shipments.*

Air Force Manual (AFMAN) 32-4005, *Personnel Protection and Attack Actions.*

AFMAN 91-201, *Explosives Safety Standards.*

Air Force Pamphlet (AFPAM) 91-214, *Operational Risk Management (ORM) Implementation and Execution.*

DoD Directive 5025.12, *Standardization of Military and Associated Terminology*

DoD 6055.9-STD, *DoD Ammunition and Explosives Safety Standards.*

Joint Publication 1-02, *DoD Dictionary of Military and Associated Terms*

Technical Order (TO) 00-25-172, *Ground Servicing of Aircraft and Static Grounding/Bonding.*

TO 11A-1-33, *Maintenance and Handling of Explosive Loaded Aircraft.*

TO 11A-1-46, *Fire Fighting Guidance, Transportation, and Storage.*

US Army Field Manual 5-103, *Survivability.*

TO 35E5-6-1, *Tent, Extendable, Modular.*

TO 35E4-94-1, *Expandable Shelter/Container.*

TO 35E4-132-1, *General Purpose Shelter.*

Abbreviations and Acronyms

AF—Air Force

AFFF—Aqueous Film Forming Foam

AFI—Air Force Instruction

AFJMAN—Air Force Joint Manual

AFMAN—Air Force Manual

AFOSH—Air Force Occupational Safety and Health

AFPAM—Air Force Pamphlet

AFSC—Air Force Safety Center

AGE—Aerospace Ground Equipment

AIG—Address Indicator Group

AIM-9—Air Interceptor Missile (Sidewinder)

AWG—American Wire Gauge

BASH—Bird Aircraft Strike Hazard

BWS—Base Weather Station

CAPA—Combat Aircraft Parking Area

CB—Chemical-Biological

CE—Civil Engineering

CPR—Cardiopulmonary Resuscitation

CTK—Consolidated Tool Kit

DoD—Department of Defense

DFP—Defensive Fighting Positions

DOT—Department of Transportation

DRU—Direct Reporting Unit

EET—Exercise Evaluation Team

EOD—Explosive Ordnance Division

EOR—End of Runway

ERO—Engine Running On or Off-Load

F—Fahrenheit

FOA—Field Operating Agency
FOD—Foreign Object Damage
FSSZ—Fuel Servicing Safety Zone
HAP—High Accident Potential
HATR—Hazardous Air Traffic Report
HQ—Headquarters
ICAO—International Civil Aviation Organization
ICT—Integrated Combat Turn
IDP—Installation Deployment Plan
IFE—In-Flight Emergency
IPI—In-Process Inspection.
JOAP—Joint Oil Analysis Program
JP 1-02—DOD Dictionary of Military and Associated Terms
kph—Kilometers Per Hour
LIMFACS—Limiting Factors
LOX—Liquid Oxygen
MAJCOM—Major Command
MER—Multipiece Ejector Rack
MHE—Materials Handling Equipment
MOC—Maintenance Operations Center
MOPP—Mission-Oriented Protective Postures
mph—Miles Per Hour
MRE—Meals Ready to Eat
NBC—Nuclear, Biological, Chemical
NCO—Non-Commissioned Officer
NEW—Net Explosive Weight
nm—Nautical Miles
OPLAN—Operation Plan
ORM—Operational Risk Management
PAM—Preventative Aerospace Medicine Team
OSHA—Occupational Safety and Health Administration
PDO—Publishing Distribution Office

POC—Point of Contact
POL—Petroleum, Oils, and Lubricants
PPE—Personal Protective Equipment
PWP—Powered White Phosphorous
RAC—Risk Assessment Code
RAPCON—Radar Approach Control
ROWPU—Reverse Osmosis Water Purification Unit
RRR—Rapid Runway Repair
SAS—Safety Automated System
SOF—Supervisor of flying
SPF—Sun Protection Factor
SPV—Special Purpose Vehicle
STARTEX—Start Exercise
SWA—Southwest Asia
TDY—Temporary Duty
TEMPER—Tent Extendable Modular Personnel
TER—Triple Ejector Rack
TO —technical order
TOX—Toxicology
T/R—Thrust Reverser
US—United States
USAF—United States Air Force
UV—Ultraviolet
UXO—Unexploded Ordnance
WP—White Phosphorous
WRM—War Reserve Material
WWW—World-Wide Web

Terms

Bare Base—A base having minimum essential facilities to house, sustain, and support operations to include, if required, a stabilized runway, taxiways, and aircraft parking areas. A bare base must have a source of water that can be made potable.

Beddown—Common terminology used for the destination of combat forces in a theater (equivalent to a destination).

Camouflage, Concealment, and Deception—The use of concealment, disguise and decoys to minimize the possibility of detection or identification of troops, material, equipment and installations. It includes taking advantage of the natural environment as well as the application of natural and artificial materials.

Chemical Defense—The methods, plans and procedures involved in establishing and executing defensive measures against attack utilizing chemical agents.

Chemical Warfare—All aspects of military operations involving the employment of lethal and incapacitating munitions/agents and the warning and protective measures associated with such offensive operations. Since riot control agents and herbicides are not considered to be chemical warfare agents, those two items will be referred to separately or under the broader term "chemical", which will be used to include all types of chemical munitions/agents collectively. The term "chemical warfare weapons" may be used when it is desired to reflect both lethal and incapacitating munitions/agents of either chemical or biological origin.

Contingency—An emergency involving military forces caused by natural disasters, terrorists, subversives, or by required military operations. Due to the uncertainty of the situation, contingencies required plans, rapid response, and special procedures to ensure the safety and readiness of personnel, installations, and equipment. See also **contingency contracting**. (JP 1-02)

Contingency Operations—A military operation that is either designated by the Secretary of Defense as a contingency operation or becomes a contingency operation as a matter of law (10 United States code (USC) 101[a] [131]). It is a military operation that: a. is designated by the Secretary of Defense as an operation in which members of the Armed Forces are or may become involved in military actions, operations, or hostilities against an enemy of the United States or against an opposing forces; or b. is created by definition of law. Under 10 USC 101 (a)(13)(B), a contingency operation exists if a military operation results in the (1) callup to (or retention on) active duty of members of the uniformed Services under certain enumerated statues (10 USC Section 688, 12301(a), 12302, 12304, 12305, 12406, or 331-335); and (2) the callup to (or retention on) active duty of members of the uniformed Services under other (non-enumerated) statutes during war or national emergency declared by the President or Congress. See also **contingency; operation**. (JP 1-02)

Deployment—The relocation of forces to designated areas of operations.

Deployment Planning—Operational planning directed toward the movement of forces and sustainment resources from their original locations to a specific operational area for conducting the joint operations contemplated in a given plan. Encompasses all activities from origin or home station through destination, specifically including and intratheater movement legs, staging areas, and holding areas. See also **deployment; deployment order; deployment preparation order**. (JP 1-02)

Exercise—A military maneuver or simulated wartime operation involving planning, preparation, and execution. It is carried out for the purpose of training and evaluation. It may be a combined, joint, or single-Service exercise, depending on participating organizations.

Force Beddown—The provision of expedient facilities for troop support to provide a platform for the projection of force. These facilities may include modular or kit-type substitutes.

Foreign Object Damage (FOD)—Rags, pieces of paper, line, articles of clothing, nuts, bolts, fasteners, or tools that, when misplaced or caught by air currents normally found around aircraft operations (jet blast, rotor or prop wash, engine intake), cause damage to aircraft systems or weapons or injury to personnel.

Harvest Eagle—A nickname for an air transportable package of housekeeping equipment, spare parts, and supplies required for support of US Air Force general-purpose forces and personnel in bare base conditions. Examples of Harvest Eagle equipment are water purification units, tents, and showers. Each kit is designed to provide softwall housekeeping support for 1100 personnel.

Harvest Falcon—Harvest Falcon is a nickname given to a selected package of mobile facility, utility and equipment assets required to support forces and aircraft under bare base conditions. These WRM assets are packaged in air transportable sets to include housekeeping, industrial, initial flightline and follow-on flightline. Harvest Falcon sets are designed to support increments of 1,100 personnel and squadron size aircraft deployments.

Hazard—A condition with the potential to cause injury, illness, or death of personnel; damage to or loss of equipment or property; or mission degradation. See also **injury; risk**. (JP 1-02)

Hazardous Cargo—Explosives and other hazardous articles such as flammable liquids and solids, oxidizing materials, corrosive materials, compressed gases, poisons, irritating materials, etiologic agents, radioactive material, and other unregulated cargo.

Hazardous Materials—A substance or material that is capable of posing an unreasonable risk to health, safety, and property when transported and has been so designated by AFJMAN 24-204, *Preparing Hazardous Materials for Military Air Shipments*. May also be referred to as hazardous cargo or dangerous goods.

Heat-Related Illnesses—Heat-related illnesses such as fainting from heat, heat exhaustion, and heat stroke are far more serious than a sunburn. These conditions occur when workers become very overheated and dehydrated, and in many cases, they are accompanied by sunburn. The following may be symptoms of heat-related illnesses: nausea, vomiting, fainting, high fever, delirium, or diarrhea, and medical care may be needed.

Host Unit—The organization designated by the host MAJCOM or HQ USAF to furnish support to a tenant unit. The host unit develops, publishes, and maintains the base mobility guidance to support the deployment of Air Force units from a particular base.

Limiting Factor (LIMFAC)—A factor or condition that, either temporarily or permanently impedes mission accomplishment. Illustrative examples are transportation network deficiencies, lack of in-place facilities, and malpositioned forces or materiel, extreme climatic conditions, distance, transit or over-flight rights, political conditions, etc.

Main Operating Base—In special operations, a base established by a joint force special operations component commander or a subordinate special operations component commander in friendly territory to provide sustained command and control, administration, and logistical support to special operations activities in designated areas. Also called **MOB**. See also **advanced operations base; forward operations base**. (JP 1-2)

Marshalling Area—A location in vicinity of a reception terminal or prepositioned equipment storage site where arriving unit personnel, equipment, materiel, and accompanying supplies are reassembled, returned to the control of the unit commander, and prepared for onward movement. The joint complex commander designating the location will coordinate the use of the facilities with other allied commands and the host nation, and will provide life supports to the units while in the marshalling areas. See also **marshalling**. (JP 1-02)

Melanin—The protective chemical in the skin that reflects and absorbs ultraviolet (UV) rays and causes

tanning. Yellow and red melanins found in light-skinned people provide the least amount of sun protection. Brown and blue-black melanins found in dark-skinned people reflect UV rays and provide protection against sun exposure.

Mishap—An unplanned event or series of events resulting in death, injury, occupational illness, or damage to or loss of equipment or property.

Mobility—A quality or capability of military forces, which permits them to move from place to place while retaining the ability to fulfill their primary mission.

Operation Plan (OPLAN)—A plan for one or more operations that deployed units carry out simultaneously or in a series of connected stages. Higher authorities normally issue OPLANs as directives based on stated assumptions to allow subordinate officers to prepare support plans and orders.

Potable Water—Water that is safe for consumption.

Rapid Runway Repair (RRR)—The process of using construction equipment, tools, portable equipment, expendable supplies, and temporary surfacing materials to provide a minimum operating surface through expedient repair methods.

Revet—To face, as an embankment, with masonry or other material.

Reverse Osmosis Water Purification Unit (ROWPU)—A water purification device that uses a series of membranes to eliminate impurities. The ROWPU is capable of removing dissolved minerals.

Risk—1. Probability and severity of loss linked to hazards. 2. See degree of risk. See also **hazard; risk management**. (JP 1-02)

Risk Assessment—The identification and assessment of hazards (first two steps of risk management process).

Risk Management—A process by which decision makers reduce or offset risk. Also called **RM**. See also **risk**. (JP 1-02)

Safety Automated System—An Internet based mishap reporting system.

Severity—The expected consequences of an event in terms of mission impact, injury, or damage.

Sun Protection Factor (SPF)—The ratio between the time it usually takes one's skin to sunburn and how long it takes after the application of sunscreen. For example, a SPF of 15 will provide 15 times the amount of protection you'd get without using anything.

War Reserve Material (WRM)—Material required in addition to primary operating stocks and mobility equipment to attain the operational objectives in the scenarios authorized for sustainability planning in the Defense Planning Guidance. Broad categories are: consumables associated with sortie generation (to include munitions, aircraft external fuel tanks, racks, adapters, and pylons); vehicles; materiel handling equipment; aircraft engines; bare base assets; individual clothing and equipment; and munitions.

Attachment 2

SAFETY BRIEFINGS

A2.1. Deployment Briefing Operational Risk Management Considerations:

A2.1.1. Operational Risk Management applies to everyone—on and off duty. Identifying risks is everyone's job.

A2.1.2. General items to consider: Are individuals familiar with the deployment area? If not, safety concerns must be covered in greater detail. General concerns might include:

A2.1.2.1. Time differences. When traveling across time zones, people will often experience some degree of fatigue and disorientation. "Jet lag" can be minimized by doing the following:

A2.1.2.1.1. When flying commercial air as a passenger avoid alcohol during the flight.

A2.1.2.1.2. If time permits, adjust to the new time zone prior to departure? If not, attempt to adjust eating and sleeping habits incrementally during flight.

A2.1.2.1.3. Upon arrival, adjust to the new time and work schedule as quickly as possible.

A2.1.2.2. Weather. Check on the weather at destination. Aside from bringing appropriate clothing, find out if there are any unusual conditions that may require additional preparation (for example, suntan lotion, insect repellent, etc.). **NOTE:** Commanders—is unit-issued clothing (parkas, desert BDUs...) ready to go in sufficient quantities?

A2.1.2.3. Driving. Driving has the greatest potential for on and off duty mishaps. What side of the road do vehicles drive on? What are the road conditions? Are speed limits mph or kph? Do pedestrians have the right of way? Will operators need additional training and license?

A2.1.2.4. Food. Address basic questions. Is off-base food and drink safe for consumption? Can fruits, vegetables, and meats purchased off base be eaten? Are there any items, such as certain alcohol or over-the-counter drugs that contain controlled substances?

A2.1.2.5. Local Customs and Hazardous Situations or Conditions. Incorporate intelligence information into a pre-departure brief. Check with local Office of Special Investigations personnel for this information. Consider factors such as, are local people generally friendly to Americans in general and military personnel in particular? Are there any taboo actions likely to cause friction with local inhabitants? Are there any revolutionary or terrorist groups? Is there a curfew and what areas are off limits? Chances are, most people will not be familiar with the contingency location. Is the area a location where it is not a good idea to go off sightseeing or "out on the town" alone. Also, in many locations respect for authority is considered important. If approached by a policeman, cooperate fully.

A2.2. Pre-Departure :

A2.2.1. If a mass pre-departure brief is scheduled, brief any available specifics for the deployed location. Take this opportunity to introduce the Deployment Safety Officer/NCO so participating personnel will know who to contact should the need arise.

A2.2.2. Have local establishments frequented by deployed personnel been evaluated for potential risk?

A2.2.3. Have personnel received an orientation course for the local area if they are going to drive during the deployment?

A2.2.4. Are personnel reminded to wear seat belts at all times while riding in a vehicle?

A2.2.5. Are personnel reminded not to drink and drive?

A2.2.6. Have personnel received instructions for reporting all mishaps to their supervisors or assigned safety personnel?

A2.2.7. Have personnel received instructions on clothing requirements at deployed locations for both on- and off-duty activities?

A2.2.8. Are personnel deploying with personal transportation (bicycles) aware of helmet requirements? The deployment commander should evaluate the risk associated with bicycles.

A2.3. Deployed Living Conditions :

A2.3.1. If personnel are billeted in a Tent City, has the Tent City checklist been used?

A2.3.2. Do sleeping facilities have smoke detectors?

A2.3.3. If the facility is over one story; does it have installed sprinkler systems?

A2.3.4. If personnel are billeted in a hotel, brief them on:

A2.3.4.1. Fire evacuation plan.

A2.3.4.2. Meeting location (gathering point) in case of evacuation.

A2.3.4.3. How and where to seek medical care.

A2.3.4.4. Whether or not the hotel's water is potable.

A2.4. Local Conditions . Brief personnel on the following:

A2.4.1. Overall environment;

A2.4.2. Altitude (cautions about high altitude disorders or problems that can arise at sea level—such as high tide dangers);

A2.4.3. Extreme heat or cold dangers;

A2.4.4. Poisonous plants, reptiles, or insects; and

A2.4.5. Native wild animals.

Attachment 3**MOBILITY CONCEPT BRIEFING****A3.1.** Review the following items:

A3.1.1. Enforce use of seatbelts at all times and insist that all passengers wear them. Make sure seatbelts are properly worn.

A3.1.2. Smoking within 50 feet of an aircraft or within 100 feet of an aircraft during refueling operations is strictly prohibited.

A3.1.3. Hearing protection will be available and used in hazardous noise environments.

A3.1.4. Enforce use or wear of reflective material (belts or vests) during hours of darkness or reduced visibility.

A3.1.5. Prohibit the wearing of rings and jewelry when personnel work around aircraft (loading etc.)

A3.1.6. Pick up FOD—don't walk over it.

A3.1.7. Brief personnel on the following information:

A3.1.7.1. During all concurrent-aircraft refueling operations the refueling supervisor is in charge.

A3.1.7.2. All personnel entering the refueling area must first check in with the supervisor.

A3.1.7.3. Before entering aircraft personnel need to ground themselves to dissipate static electricity.

A3.1.7.4. To avoid inadvertently entering a refueling area, know the surroundings and be conscious of the environment at all times.

A3.1.8. Spotters and chocks will be used when backing vehicles in close proximity of an aircraft.

A3.1.9. Do not allow anyone to walk, park, or drive behind an aircraft that is being loaded or unloaded.

A3.1.10. Avoid shortcuts and don't excessively rush the task. Such tendencies often result in injury or damage to someone or something. A late departure is preferable to injury or damage in all cases.

A3.1.11. Ensure personnel are familiar with fire prevention practices and use of fire extinguishers.

A3.2. Use common sense—if it can't be done safely, STOP and re-evaluate the operation.

Attachment 4

MISHAP NOTIFICATION PROCEDURES

A4.1. General . Every location should have or develop a mishap response plan. A mishap response plan will ensure proper notification, investigation, and reporting procedures are in place and followed in the event of a mishap.

A4.1.1. Air Force mishap reports are used to identify problem areas and to prevent mishaps from recurring. Because of their importance, personnel must be familiar with required reporting procedures. If a mishap meets reportable criteria, required information must be collected in a timely manner to ensure mishap reporting meets established suspense's.

A4.1.2. Mishap notification procedures are established to ensure prompt and accurate notification of flight, ground, and weapons mishaps.

A4.1.3. Deployment Safety Officer or NCOs establish internal mishap reporting procedures for the deployment commander. The commander will rely on established procedures to notify home station and the safety chain of command when a mishap occurs at the deployed location.

A4.1.4. Communicate with deployed medical personnel on a regular basis to ensure reportable injuries and illnesses are identified and proper documentation is initiated.

A4.1.5. Establish liaison with the host safety officials (if available) to ensure immediate two-way communication of mishaps.

A4.2. Reportable Mishaps . Consider the following in the event a reportable mishap occurs:

A4.2.1. Remind the mission commander of toxicology (TOX) testing requirements. Testing may be appropriate if the mishap is an aircraft operations mishap or if actions of personnel indicate that those actions might have contributed to the cause of the mishap. Check availability of TOX testing at the deployed location.

A4.2.2. Remind the aircraft commander to complete a statement of the mishap. Collect any information that might be of any possible use to the report writer. Have each participant and witness provide a brief written statement of what happened, the sequence of events, and what was done to handle the situation, what they were doing at the time of the mishap, and anything else of importance they might want to add. If the mishap is aircraft-operations related, remind personnel the statements are provided and protected under executive privilege, for safety use only, and cannot be used for any form of punishment.

A4.2.3. Photograph or video the damage and ground scars for possible future use. Depending on available support, a competent photographer with a personal camera may be needed to provide assistance. In some cases the mishap investigator or safety staff may need to take the pictures.

A4.2.4. Only qualified safety personnel are authorized to conduct official safety investigations. Contact the nearest Air Force Safety Office for mishap investigation assistance. They will be familiar with AFI 91-204 and should be able to provide additional guidance if necessary.

A4.2.5. All mishap reports must be approved for release through proper channels (Class A and B Mishaps require MAJCOM approval. Contact AOR Command Safety Staff for release authority for Class C Mishaps.)

A4.2.6. All ground mishap reports will be created using Safety Automated System (SAS), this is an Internet-based reporting system. If unable to access the Internet at the deployed location contact the AOR Command Safety Staff for assistance. The AOR Command Safety Staff should provide assistance for contacting HQ AFSC to gain modem dial-up connection to SAS.

A4.2.7. Include a "FOR OFFICIAL USE ONLY" on statements of the mishap.

A4.2.8. Keep the mission commander informed on aspects of the investigation!

A4.3. Safety Response:

A4.3.1. Respond to the established entry control point, assembly point, or directly to the mishap site.

A4.3.2. Notify the on-scene commander of your availability and stand by to provide assistance.

A4.3.3. Notify the host safety office and request assistance, if required.

A4.3.4. Notify home unit command post and safety office. Ensure OPREP-3 is initiated, if required, from the host deployed command post, home unit command post, or the US Embassy.

A4.3.5. Photograph damage or abnormality, as required.

A4.3.6. Determine requirement for aircraft impoundment through the deployment commander and maintenance officer.

A4.4. Class A and B Mishaps:

A4.4.1. Initiate actions contained in the unit mishap response plan for Class A and B mishaps.

A4.4.2. Notify home station command post of mishap as soon as possible.

A4.4.3. Ensure TOX tests are initiated for all personnel if an aircraft is involved or alcohol use is suspected in any other mishap.

A4.4.4. Ensure an interim board is convened immediately, if required.

A4.4.5. Immediately impound required records and fuel samples.

A4.4.6. Ensure appropriate reporting requirements are submitted according to AFI 91-204.

A4.5. Class C Mishaps:

A4.5.1. Initiate actions contained in the unit mishap response plan for Class C mishaps.

A4.5.2. Ensure mishaps are investigated and information is forwarded to home station for proper reporting.

A4.6. Class D Mishaps:

A4.6.1. Dollar value is more than \$2,000 but less than \$20,000.

A4.6.2. Comply with required reporting.

A4.7. High Accident Potential (HAP) Mishaps:

A4.7.1. These events do not need to meet reportable mishap costs.

A4.7.2. Complete required messages.

A4.8. Birdstrikes:

A4.8.1. Retain all bird remains for analysis.

A4.8.2. Ensure birdstrike worksheet is completed and retained.

A4.8.3. Report damaging birdstrikes according to AFI 91-204.

A4.9. Dropped Objects:

A4.9.1. Work with maintenance in reporting the incident.

A4.9.2. Ensure all details are logged, including location (latitude and longitude) where object was dropped.

A4.9.3. Notify local and home station command post and safety office.

A4.9.4. Ensure OPREP-3 is completed, if required.

A4.9.5. Impound aircraft, if required.

A4.10. Hazardous Air Traffic Reports (HATR):

A4.10.1. Ensure circumstances meet the requirements for the filing of a HATR.

A4.10.2. Ensure reporting pilot completes AF Form 651, **Hazardous Air Traffic Report (HATR)**.

A4.10.3. Notify the host safety office or nearest safety office as soon as possible.

A4.10.4. Contact the U.S. Defense Attaché Office for help, if required.

A4.10.5. Notify your unit safety office and they will handle the investigating and reporting administration.

A4.11. FOD Incident:

A4.11.1. Log all details on worksheets.

A4.11.2. Work with the deployed maintenance officer.

A4.11.3. Determine probable mishap class based on the extent of damage to the aircraft and cost estimates.

A4.11.4. Notify host and home station safety office.

A4.11.5. Complete required messages.

Attachment 5

GEAR

A5.1. Professional Gear. The following list of recommended items is provided for those members that will be responsible for mishap prevention and safety related duties while deployed. Also, check MAJCOM and local safety guidance prior to deployment for unique requirements.

A5.1.1. Safety Publications:

A5.1.1.1. AFI 91-202, *The US Air Force Mishap Prevention Program.*

A5.1.1.2. AFI 91-204, *Safety Investigations and Reports.*

A5.1.1.3. AFI 91-207, *The US Air Force Traffic Safety Program.*

A5.1.1.4. AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program.*

A5.1.1.5. AFI 91-302, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Standards.*

A5.1.1.6. Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards.*

A5.1.1.7. Any AFOSH Standards applicable to the mission or operation.

A5.1.1.8. TO 00-25-172, *Ground Servicing of Aircraft and Static Grounding/Bonding.*

NOTE: Many publications are available electronically (AFIs, AFMANs, AFOSH Stds, etc.) Deploy with publications on CD or loaded on a laptop computer, also take checklists, deployment guides, and any other documents that might be useful while performing safety duties.

A5.1.1.9. Point of contact (POC) listing and miscellaneous information. Assemble a listing of POCs at the nearest MOB and the safety chain-of-command for the deployed location before departure. If this is not possible, make it a priority upon arrival. Also, obtain local conditions and driving guides for the deployed location. This information is available on the AFSC web-page and individual MAJCOM web-pages. Bring phone numbers (DSN and Commercial) of home station bioenvironmental services and fire department technical services. Bring the phone numbers of NAF and MAJCOM safety offices, include weapons and flight related safety contact information too.

A5.1.1.10. Laptop Computer. Ensure computer is CD and Internet capable (modem and network interface card) with current software programs loaded. Consider electrical power needs, if deploying outside the US. Voltage and plug adapters may be necessary. Know how to use electrical conversion equipment before departure.

NOTE: If unable to deploy with a laptop computer check with the communications personnel upon arrival at the deployed location. Generally, there will be some computer support available for official use and it may be located in a central location. This may be inconvenient, but the job can still be accomplished with limited computer support.

A5.1.1.11. Cell Phone, radios, beepers, scanners. Devices should have world wide capabilities, again be familiar with operating procedures before departure.

A5.1.1.12. Measuring devices. A measuring wheel, range finder, 100ft metal tape, or global positioning indicator might prove useful if required to identify distance or clearance requirements.

A5.1.1.13. Mishap Kit. See AFP 127-1, Vol 1, *US Air Force Guide To Mishap Investigation* (still available on the web) or consult MAJCOMs for recommended kit items.

A5.1.1.14. Digital or Polaroid Camera. Know operating procedures before departure. Have extra film for the Polaroid or standard cameras.

A5.1.1.15. Batteries. Include extras for electronic equipment.

A5.1.1.16. Office Supplies. Pens, pencils, paper, floppy disks, sticky note pads, clipboard, calculator, protractor, compass, markers, metric scale 1:5,000 and standard scaled rulers, and any other items that may be useful.

A5.1.1.17. Safety Supplies. Several sets of danger tags (AF Forms 979, 980, 981), Hazard Reports, AF Form 457, **USAF Hazard Report**, AF Form 943, **Explosives Safety Site Plan**, and continuation sheets, AF Form 1118, **Notice of Hazard**, Bird Aircraft Strike Hazard (BASH) worksheets, mishap response plan, mishap notification posters with spaces to fill in name, location, phone numbers/radio call sign of safety personnel, and weather proof document protectors.

A5.1.1.18. Surveyor or Engineer Tape. Marking areas or warning of hazards.

A5.1.1.19. Snap Lights (Glow Sticks). Warning devices.

A5.1.1.20. Backpack or Pouch. Carry pro gear while deployed and engaged in daily activities.

A5.1.1.21. Personal Protective Equipment. Hard hat, steel toed boots, reflective belt.

A5.1.1.22. Cassette recorder, tapes, and batteries.

NOTE: If possible, palletize gear for shipment, hand-carry only essential gear for immediate use upon arrival at the deployed site. If available, consider palletizing a collapsible table and folding chair. If pallet space is not available, ensure excess baggage is authorized on travel orders.

A5.2. Personal Gear. Mandatory clothing items should be predetermined by local readiness agencies or appropriate authority, however, typical personal gear required for deployment might include:

A5.2.1. Duffel or A-Bags. To pack and carry gear. If deploying with a large group of people and all bags are identical it may be helpful to mark your bags with tape or other identifiable device around the bag's handle. This will make bag identification easier.

A5.2.2. BDU Cap--2 each.

A5.2.3. BDUs--4 sets.

A5.2.4. Boots--combat or steel toe, 2 pair.

A5.2.5. Socks, Black--6 pair.

A5.2.6. Briefs/Undershirts--6 pair.

A5.2.7. Belt, BDU--1 each.

A5.2.8. Jacket, Field and/or Gortex--1 each with liner.

A5.2.9. Gloves, Leather--2 pair with inserts.

A5.2.10. Rain Gear--Full rain gear set with pants, a poncho may not provide adequate protection in all conditions.

A5.2.11. Bath Towel--2 each.

A5.2.12. Shower Shoes or Water Socks.

A5.2.13. Extra pair of boot blousing straps.

A5.2.14. Civilian Clothing--1 full set; consider packing at least one set of gym or workout clothing with gym shoes.

NOTE: Recommend packing a minimum of two sets of BDUs and undergarments sealed in plastic bags. This may prevent clothing from getting wet should bags get wet or rained on. This also applies to a sleeping bag or bedding items too. Place sleeping bag or bedding inside a plastic bag or anything that will keep it dry while traveling.

A5.3. Additional Items.

A5.3.1. A 60-Day Supply of Toiletries. Bar soap, shampoo, shaving cream and razors, toothbrush and paste, deodorant, and a brush or comb. Females will want to include sanitary products.

A5.3.2. Prescribed medication. 60-Day supply, birth control pills, etc.

A5.3.3. Prescription eyeglasses--extra pair for daily use, sunglasses, and gas mask inserts.

A5.3.4. Moisturizing lotion or body power.

A5.3.5. Toilet paper--2 rolls.

A5.3.6. Personal grooming items--1 each, nail clippers, tweezers, and a small mirror.

A5.3.7. Bath or welcome mat.

A5.3.8. Clothes hangers, clothes pins, and 15-20 ft of cord--hang wet items to dry.

A5.3.9. Laundry bag and permanent marking laundry pen.

A5.3.10. Pocket knife, or multipurpose tool.

A5.3.11. Battery operated or wind-up alarm clock.

A5.3.12. Baby or wet wipes--1 box, it may be several days before showers or running water becomes operational.

A5.3.13. Scrub or clean toilet brush--1 each, to clean mud from boots before entering tents or living quarters.

A5.3.14. Pillow and sheet--1 each, for comfort while sleeping.

A5.3.15. Flashlight--consider waterproof type. Take extra batteries.

A5.3.16. Duct or electrical tape--1 roll.

A5.3.17. Spending money. Take small bills and at least one or two blank personal checks. A field exchange will probably be established at some point and items such as soda, candy bars, and small personal items may be available for purchase.

A5.3.18. Prepaid telephone calling card.

A5.3.19. Playing cards--1 deck.

A5.3.20. Stationary, address book, and stamps.

A5.3.21. Laundry soap.

A5.3.22. Insect repellent.

A5.3.23. Sunscreen. Minimum of 30 SPF.

A5.3.24. Moleskin. A covering for blisters.

A5.3.25. Personal effects to pass time such as a paperback book and a personal portable stereo--with headphones.

NOTE: While it is impossible to list all the items needed or actions necessary to adequately prepare for all deployed operations, the information provided here should be helpful. Keep in mind that winter conditions may necessitate additional gear, such as a parka, boots, scarf, gloves, etc. The same is true for desert climates. In the latter goggles, and a scarf for face and neck protection against blowing sand might be required. As previously stated local readiness agencies should be the first point of contact for answering deployment concerns.

Attachment 6

SAFETY MANAGEMENT CONTINUITY BOOK

To facilitate the smooth transition of the safety program from one safety staff to the next, establish and maintain information in a continuity book or file. The following topics should be considered for inclusion.

A6.1. Continuity Book Index:

- A6.1.1. Local command or safety policies.
- A6.1.2. Inspection procedures. Include any logs or reports used to document inspection results. (See [Chapter 15](#))
- A6.1.3. Mishap notification procedures.
- A6.1.4. Mishap response plans or procedures.
- A6.1.5. Hazard reporting procedures.
- A6.1.6. Hazardous air traffic reporting procedures.
- A6.1.7. Points of contact to include telephone numbers or radio call signs.
- A6.1.8. A log of reportable mishaps.
- A6.1.9. Any additional pertinent information.

Attachment 7

SAMPLE DEPLOYMENT OPERATIONAL RISK ASSESSMENT MATRIX

To determine the amount of risk involved during deployment operations, circle the number corresponding to the known hazards listed on the charts. Then total all the numbers to get a final idea of how risky the deployment will be. Check the risk gauge at the end to determine how much risk is involved. Take action to eliminate or reduce risks whenever possible.

1. PLANNING

GUIDANCE	PREPARATION		
	IN-DEPTH	ADEQUATE	MINIMAL
VAGUE	3	4	5
GENERAL	2	3	4
SPECIFIC	1	2	3

2. HUMAN FACTORS

LIVING CONDITIONS	DUTY CYCLE		
	NORMAL	EXTENDED	MAXIMUM
FIELD	3	4	5
HARD BILLETTS	2	3	4
HOME STATION	1	2	3

3. CLIMATE

PROTECTION	CONDITIONS		
	GOOD	MODERATE	SEVERE
NONE	3	4	5
PARTIAL	2	3	4
FULL	1	2	3

4. COMPLEXITY

COMMAND AND CONTROL	OPERATIONS		
	SIMPLE	ROUTINE	COMPLEX
JOINT	3	4	5
BILATERAL	2	3	4
UNILATERAL	1	2	3

5. PERSONNEL

SUPERVISORS	SUBORDINATE		
	HIGHLY QUALIFIED	QUALIFIED	TRAINING
INEXPERIENCED	3	4	5
EXPERIENCED	2	3	4
HIGHLY EXPERIENCED	1	2	3

6. OPS TEMPO

GENERATION	UTILIZATION RATE		
	LOW	MEDIUM	HIGH
MAXIMUM	3	4	5
NORMAL	2	3	4
MINIMUM	1	2	3

7. OPERATING LOCATION

SUPPORT	FACILITIES		
	OPTIMAL	ADEQUATE	MINIMAL
NONE	3	4	5
PARTIAL	2	3	4
FULL	1	2	3

1. PLANNING	
2. HUMAN FACTORS	
3. CLIMATE	
4. COMPLEXITY	
5. PERSONNEL	
6. OPS TEMPO	
7. OPERATING LOCATION	
TOTALS	

RISK GAUGE

7-14	15-21	22-28	29-35
GREEN	YELLOW	ORANGE	RED
LOW	LOW CAUTION	HIGH CAUTION	HIGH RISK